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# REPORT

ON THE

# Medical Department

FOR THE YEAR

## 1935.

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*To be purchased from the Government Printing Dept. (Publications Branch),*
*Accra, Gold Coast Colony, and from the Crown Agents for the Colonies,*
*4 Millbank, London, S.W.1.*

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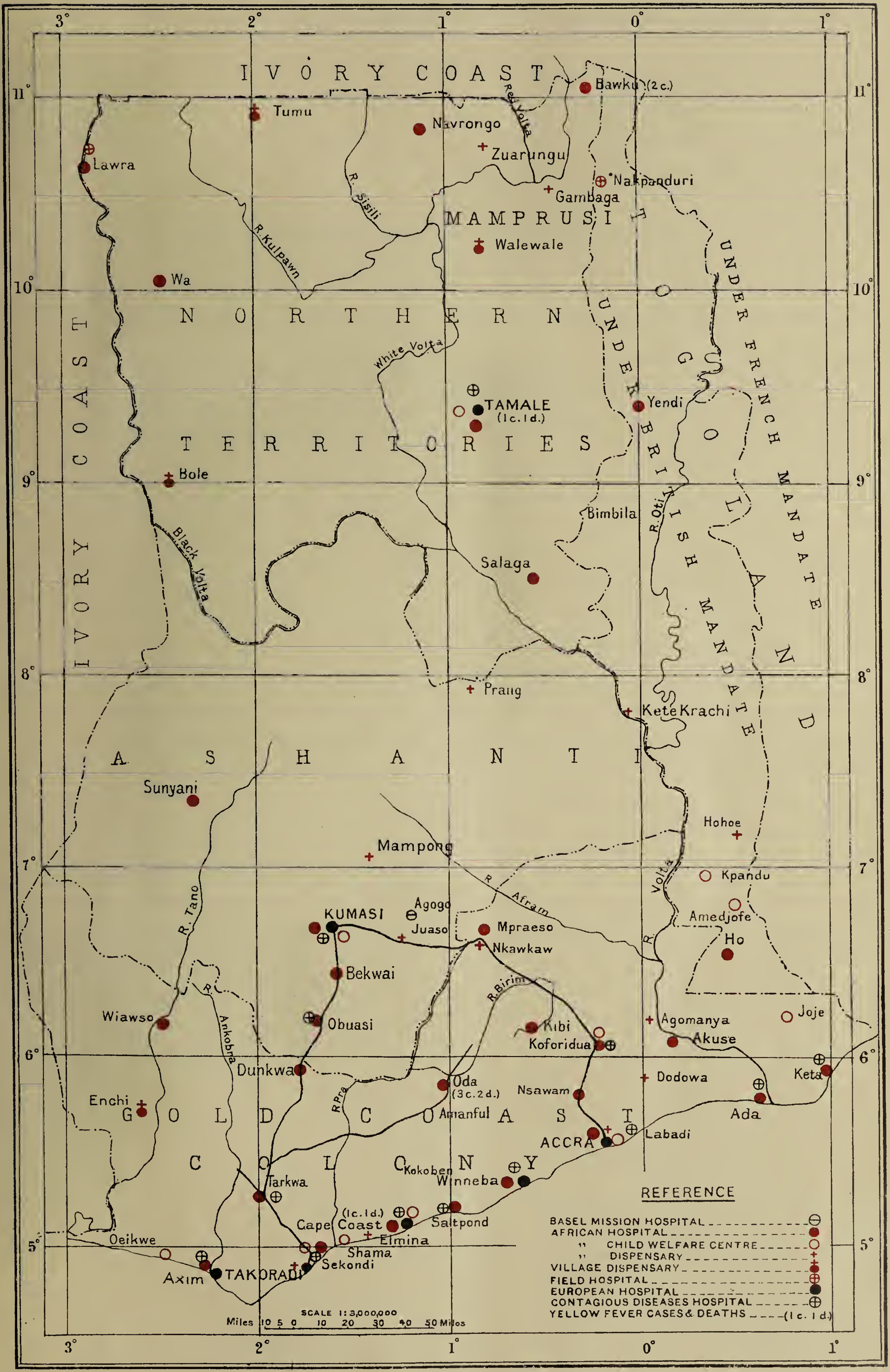
THE GOLD COAST MEDICAL FACILITIES MAP.



No. 640 113/35/87.

MEDICAL DEPARTMENT,
P.O. BOX 138,
ACCRA,
30th April, 1936.

# ANNUAL MEDICAL AND HEALTH REPORT, 1935.

SIR,

I have the honour to submit for the information of His Excellency the Governor and for transmission to the Right Honourable the Secretary of State, the Medical Report on the Health and Sanitary conditions of the Gold Coast for the year 1935 together with the Returns, etc., appended thereto.

I have the honour to be,

Sir,

Your obedient Servant,

P. S. SELWYN-CLARKE,
*Acting Director of Medical Services.*

THE HONOURABLE
THE COLONIAL SECRETARY,
VICTORIABORG, ACCRA.

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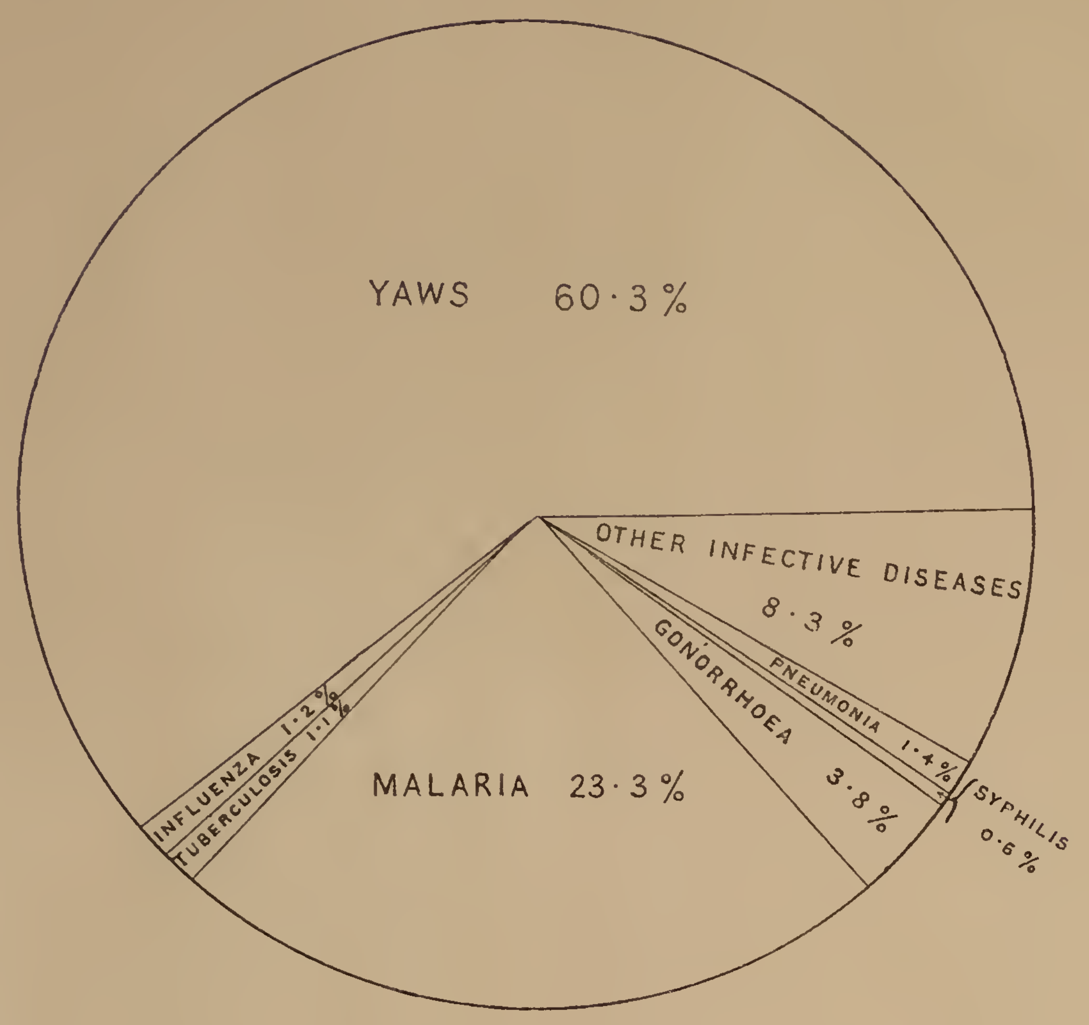
1.—Map of the Gold Coast showing medical facilities and also areas where Yellow Fever occurred during the year ... ... ... Facing cover

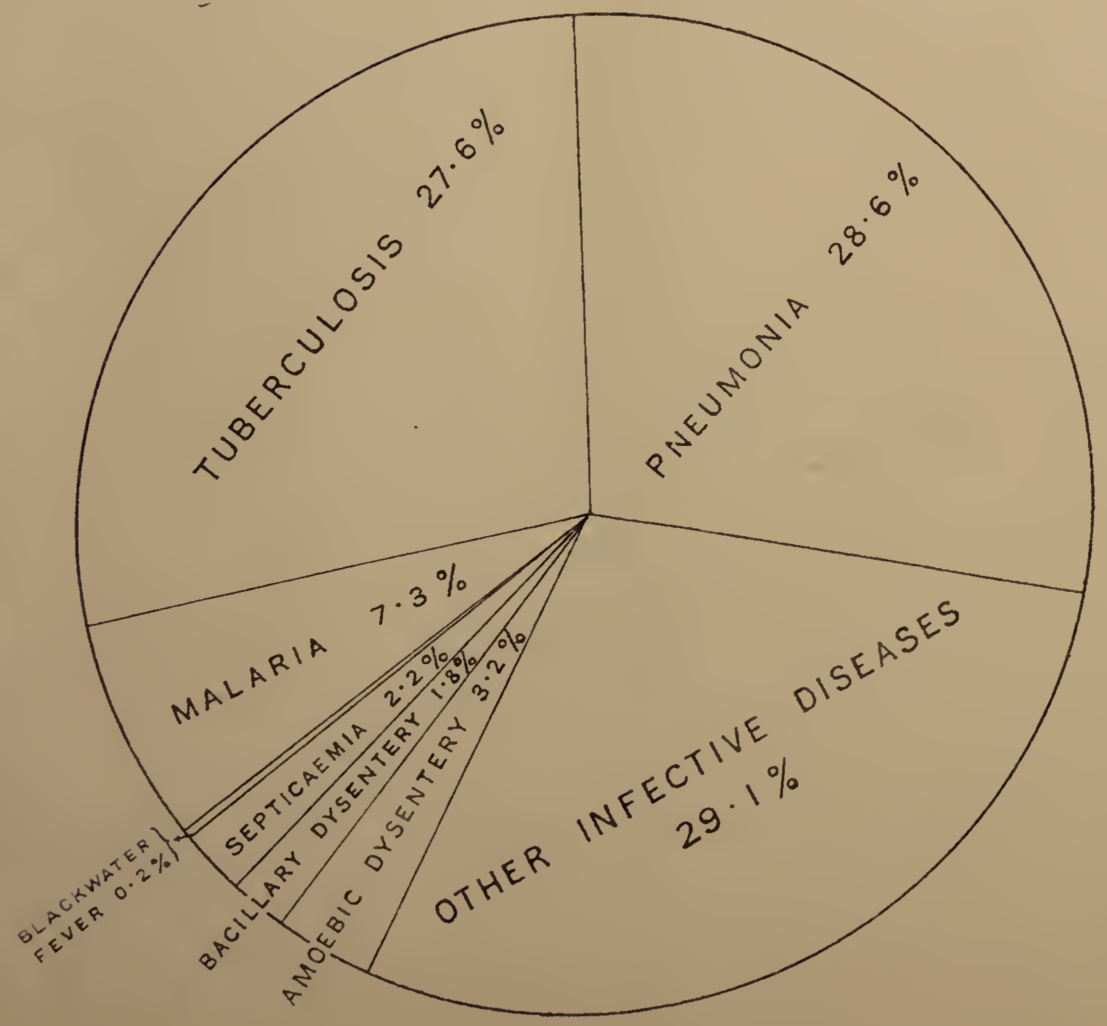
2.—Diagrams showing the incidence of various diseases ... ... Facing 1

Infective Diseases, total cases treated in 1935 = 110,934.

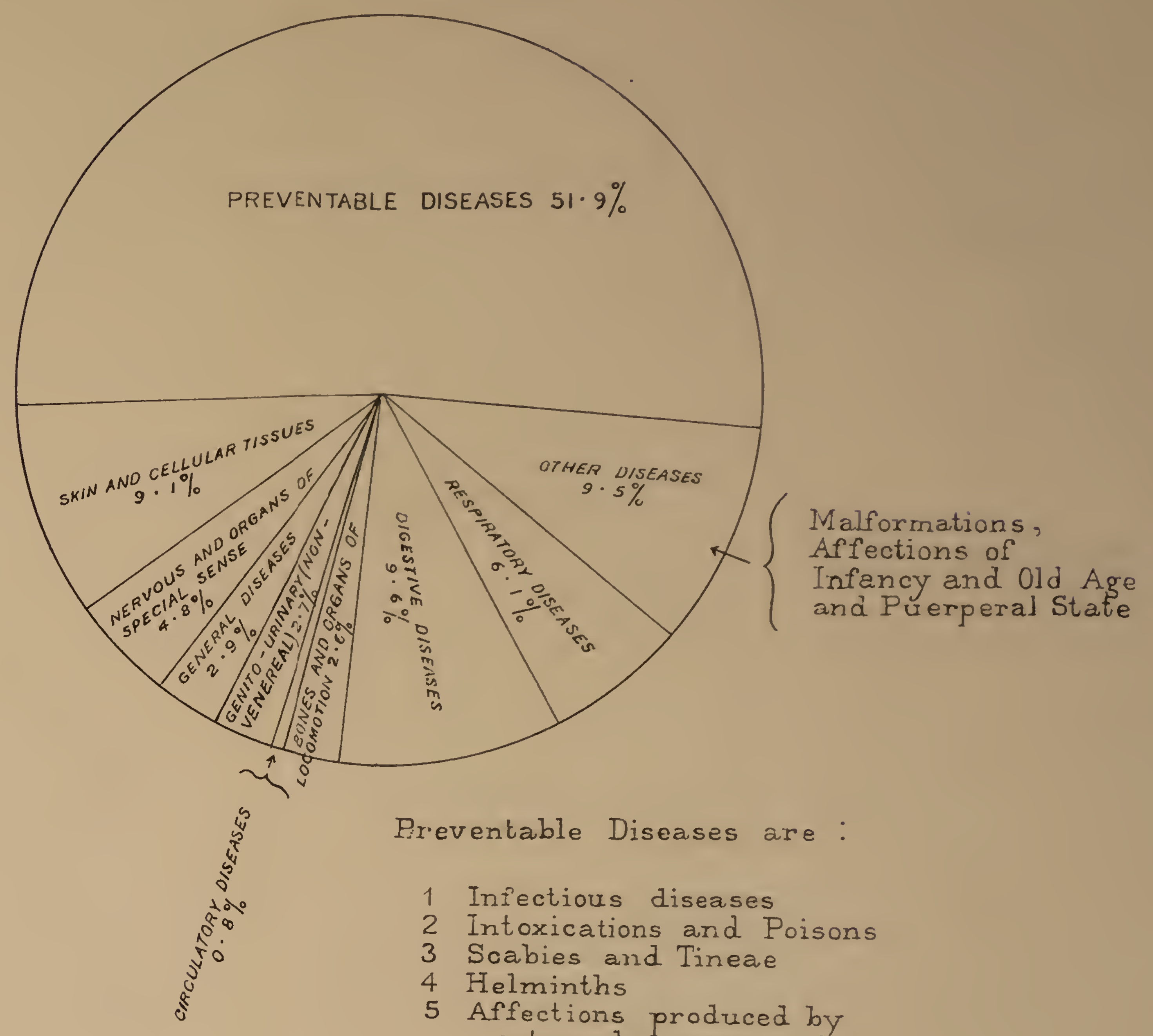


Infective diseases include all diseases under heading "Epidemic Endemic and Infectious Diseases" plus Pneumonia.

Total deaths in in-patients (infective diseases) = 781.



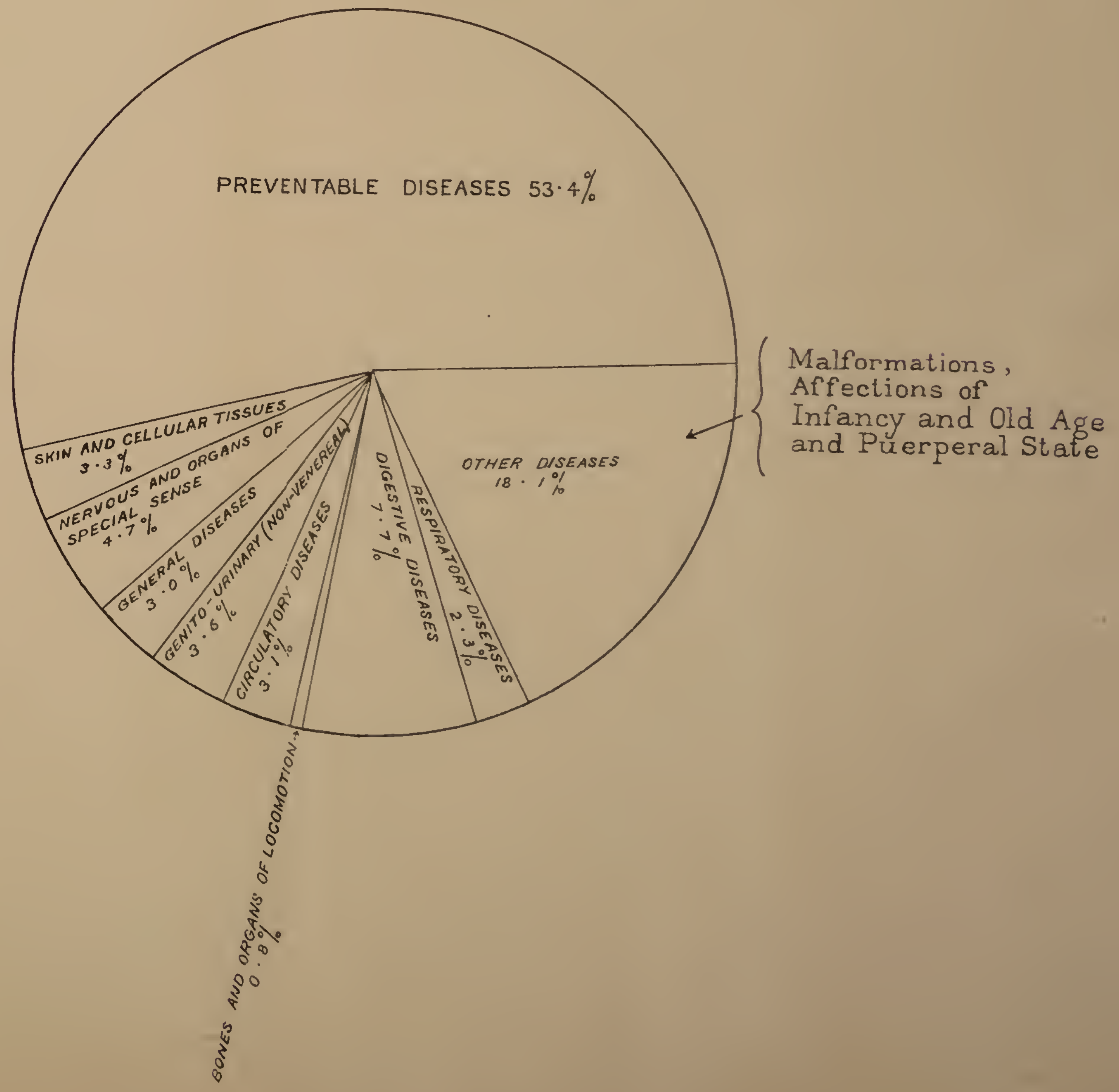
General Systemic and Preventable Diseases, total cases treated in 1935 = 273,476.



Preventable Diseases are :

1 Infectious diseases
2 Intoxications and Poisons
3 Scabies and Tineae
4 Helminths
5 Affections produced by external causes.

Total deaths in in-patients (all causes) = 1,841.



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# Annual Medical and Health Report for the Year 1935-36.

## I.—ADMINISTRATION.

### (a) Staff—Medical, Health and Laboratory Branches.

### (a) MEDICAL BRANCH.

### European Staff.

*Appointments :—*

Medical Officers : Dr. S. W. Cooper, Dr. H. G. Waters, Dr. P. C. Cosgrove.
Nursing Sister : Miss Cecily Hubbard.

*Transfers :—*

Senior Medical Officers : Dr. J. R. Forde from Gambia ; Dr. A. M. Wilson Rae to Gambia.

Medical Officers : Dr. D. R. Griffith from Achimota College ; Dr. A. J. Murray from Nigeria ; Dr. D. Scott Johnson from Gambia ; Dr. H. S. Townsend to Health Branch ; Dr. S. A. Maclean to Health Branch ; Dr. J. Hamilton to Health Branch ; Dr. K. C. MacKenzie from Health Branch.

Senior Nursing Sisters : Miss D. J. Taylor to Nigeria ; Miss C. E. Robinson from Nigeria.

*Retirements :—*

Medical Officers : Dr. O. G. Wilde, Dr. T. V. Fitzpatrick.
Nursing Sister : Miss M. E. Phillips.

### African Staff.

*Promotions :—*

Medical Officer (Gold Coast) : Dr. J. E. O. Amegatcher ; First Division Nurse : One.

*Appointments :—*

Medical Officer (Gold Coast) : Dr. Agnes Y. Savage from Achimota College.
Junior Medical Officers (Gold Coast) : Dr. J. E. Armah, Dr. N. Q. Hesse.
Second Division Dispensers : Thirteen.
Second Division Nurses : Ten.
Mental Nurses : Four.
Dispensers-in-Training : Eleven.
Nurses-in-Training : Twenty-eight.
Midwives-in-Training : Twenty-four.
Second Division Clerks : Four.

*Deaths :—*

Medical Officer (Gold Coast) : Dr. E. Tagoe.
Second Division Nurse : One.
Laboratory Attendant : One.
Mental Nurse : One.

*Retirements :—*

Second Division Clerk : One.
Second Division Nurses : Seven.
Nurses-in-Training : Nine.
Midwives-in-Training : Thirteen.
Mental Nurses : Three.

### (*b*) HEALTH BRANCH.

#### European Staff.

*Appointments* :—

Senior Health Officer : Dr. H. P. Fowler.
Medical Officers of Health : Dr. J. Hamilton, Dr. S. A. Maclean, Dr. H. S. Townsend.
Sanitary Superintendent : Mr. W. B. Paterson.

*Retirements* :—

Medical Officer of Health : Dr. J. F. Southward.
Sanitary Superintendent : Mr. W. J. Cooke.

#### African Staff.

*Appointments* :—

Sanitary Inspectors-in-Training : Thirteen officers.

*Retirement* :—

Second Division Sanitary Inspector : Mr. J. H. W. Ampoh.

### (*c*) LABORATORY BRANCH.

#### African Staff.

*Appointment* :—

Laboratory Attendant : One.

### (*d*) TRYPANOSOMIASIS SURVEY.

*Appointments* :—

Laboratory Attendants : Three.

## (b) Ordinances affecting the Public Health.

2. The following were among the more important Orders and Regulations made during the period under review :—

(*a*) Regulations No. B26 of 1935—new Mining Health Areas Regulations.

(*b*) Orders applying the provisions of the Mining Health Areas Ordinance to Atiankama, Adowsena, Ntubia, Jyedem, Tamsoo and Effuenta, Bogosu, Boabedroo, Beposo.

(*c*) The provisions of the Towns Ordinance were applied to Bogosu, Bawdua, Senchi, New Bogosu, Jyedem, Dabala and Amantem Nkwanta.

(*d*) The provisions of the Births, Deaths and Burials Ordinance were applied to Bawku and Wa in the Northern Territories and to Wenchi and Mampong in Ashanti.

(*e*) Orders declaring Nsawam, Sekondi, Takoradi, Winneba, Somanya, Accra, Kumasi, Western Dagomba, Koforidua, Bekwai and the Kusasi Area infected with rabies.

(*f*) Order No. B2 of 1935 declared sleeping sickness to be an infectious disease under the Infectious Diseases Ordinance ; and Order No. B17 of 1935 declared diphtheria an infectious disease.

## (c) Finance.

3. The total revenue earned by the Medical Department (all branches) during the year 1935 amounted to £55,719 as compared with £42,444 in 1934.

4. The total ordinary (i.e. recurrent) expenditure for the Colony was £2,603,096.

5. The total ordinary (i.e. recurrent) expenditure for medical services (all branches) was £293,431 as compared with £282,258 in 1934. This figure is exclusive of the cost of buildings, e.g. hospitals, dispensaries, etc., and other public health works such as water supplies, town improvements, etc.

6. The ratio of the ordinary expenditure on medical services to the total expenditure of the Colony was 11·27 per centum as compared with a ratio of 12·09 per centum last year.

7. A detailed financial statement for the year appears at Return B of the returns—*see* page 52.

8. The following table shows the ordinary (recurrent) expenditure under the Heads : Medical, Health and Research over seven years, as compared with the total ordinary (recurrent) expenditure for the Colony.

TABLE I.

| Branch. | 1930–31. (Actual). | 1935. (Actual). | 1936. (Estimated). |
|---|---|---|---|
| | £ | £ | £ |
| Medical ... ... ... ... ... ... | 195,450 | 169,000 | 186,874 |
| Health ... ... ... ... ... ... | 154,986 | 117,199 | 125,833 |
| Research ... ... ... ... ... | 18,647 | 7,232 | 7,581 |
| Total ... ... ... ... | £369,083 | 293,431 | 320,288 |
| Total for Colony ... ... ... | £2,872,385 | 2,603,096 | 2,428,986 |
| Percentage of total to Colony total ... ... | 12·82 | 11·3 | 13·2 |

## II.—PUBLIC HEALTH.

### (a) General Remarks.

### (I) HISTORICAL SURVEY.

9. In continuation of the procedure adopted in the Annual Report of the Medical Department of this Colony for the period 1933–34, the following represent the more important landmarks in 1934 and 1935.

1934.

Two cases of yellow fever in Africans, both fatal.

Forty-eight cases of smallpox with 14 deaths in Ho district, one case Somanya.

Incidence of sleeping sickness increased to nearly one per centum of all cases treated.

Pipe-borne water supply inaugurated at Kumasi at cost of £225,100.

New 32-bed hospital opened at Keta to replace one destroyed by sea.

Important amendment to mining health legislation relating to housing and medical examination of labourers.

1935.

No serious epidemic, but definite set-back in health of population as shown by increase in general and infant mortality rates.

Seven cases of yellow fever with four deaths in Africans.

Considerable increase in number of cases of sleeping sickness seen in Northern Territories. Special commission met at Kumasi to consider and report on ways and means of investigating and combating the disease.

Staff of medical officers—other than administrative officers—numbered 66 on 1st January, 1935, and treated 273,476 patients in hospitals, dispensaries and welfare centres as compared with a staff of 90 on 1st April, 1929, during which year 249,476 patients were treated.

Start made on new 32-bed hospital at Tarkwa.

Ante-natal ward of 12 beds presented by Gold Coast Red Cross to Accra Maternity Hospital.

New Mining Health Areas Regulations drawn up in consultation with Chamber of Mines governing sanitary control of mining and mining health areas, housing of labourers, etc.

Satisfactory progress made in some areas in housing for African and European mining community.

Considerable increase in immigration from neighbouring territories.

Gold Coast Colony represented at Pan-African Health Conference, Johannesburg.

## (II) FACTORS AFFECTING PUBLIC HEALTH DURING 1935.

10. It is with regret that a serious set-back has to be recorded in the health of the people of the Gold Coast in the year under review. Some indication of this was manifest early in 1935 when the returns of deaths in the registration areas scattered throughout the Colony were compiled. The Principal Registrar of Births, Deaths and Burials* pointed to the fact that a slight but definite rise had taken place in the death-rate in 1934. During 1935 this increase amounted to the alarming figure of three per thousand of the population living in 31 registration districts. Furthermore, all but four of such areas showed an increased death-rate ; while in one populous centre, the rate rose by over 50 per centum above the corresponding rate for the previous year.

As might be expected with a rise in the total death-rate, the infant mortality rate for 1935 was regrettably higher than for 1934.

In later sections of this report it will be observed that the invaliding rates for both European officials and non-officials shared in this deterioration ; although the actual death-rate of these sections of the community showed a decrease. It is difficult to hazard an explanation for this, but it might be desirable to mention certain factors.

### (*a*) IMMIGRATION OF UNDER-NOURISHED AND DISEASED ELEMENTS.

11. The Colony enjoyed the beginnings of a return to prosperity in 1935 as shown by the fact that the revised estimated revenue for the financial year 1935–36 actually exceeded the original estimate by £545,840. This prosperity was partly due to the fact that the price of cocoa had been steady throughout 1935, but it was chiefly due to the rapid developments which took place in the mining industry and the direct result of this on railway and harbour revenues, the purchasing power of the people and increased import and sale of goods. There is little doubt that natives from neighbouring foreign territories heard of this boom and decided to seek to share in it. The Deputy Director of Health Service draws attention to this on page 25 of this report and provides data in his report† on vital statistics for 1935 which suggest that the tide of immigration which has swept the country may account in part at least for the heavy death toll.

### (*b*) LOW STANDARD OF HYGIENE, ESPECIALLY IN RURAL AND MINING AREAS.

12. Contributory factors probably include insanitary conditions in the rural—as against town—areas particularly where, in mining regions, collections of hovels have grown up with no pretence of plan and without any of the necessary sanitary requirements. Further details of this unsatisfactory state of affairs are included in the Health section of this report.

In so far as mining areas are concerned, these will be dealt with under the new mining health legislation which became law in 1935.

13. Meanwhile the standard of hygiene in the countryside of the Colony and Ashanti is steadily becoming worse. This state of affairs is aggravated by the requirements of the Labour Ordinances passed in 1935, which implement the Forced Labour Convention to which the Gold Coast has acceded. It is true that under the Convention sanitation is regarded as a minor communal service and that, therefore, communal labour employed for health purposes is not forced labour ; but on the other hand such labour cannot be exacted without the consent of the community, and that consent in many cases is not forthcoming. Other measures must, therefore, be taken to provide communal field latrines, to clear bush around dwellings and villages, and to arrange the sanitary disposal of household refuse, etc.

14. It is obvious that the revenue of the Colony is inadequate to permit these and similar services being carried out in rural areas at Government expense, even if such a course was desirable.

15. The solution of the problem depends upon the successful establishment of local Government, whether by way of the Native Administrations or by the inauguration of local sanitary boards with power to collect revenue. The question is a difficult one, but Government has the matter in hand ; and it is hoped that the necessary health legislation will be placed before the Legislative Council at an early date. Little can be done to improve health conditions in rural areas in the transitional period.

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*Annual Summary and Report of the Principal Registrar of Births, Deaths and Burials of the Gold Coast Colony, 1934, Government Printer, Accra.

†Annual Summary and Report of the Principal Registrar of Births, Deaths and Burials of the Gold Coast, 1935. Government Printer, Accra.

### (*c*) INCREASED FACILITIES FOR THE DISSEMINATION OF DISEASE.

16. Yet another possible cause of the increased morbidity and death-rate in the Colony as a whole is attributed to the opening up of the country resulting in a much more fluid population. In former times a village in the Northern Territories, for example, might be invaded by such a severe outbreak of, say, sleeping sickness that the population became decimated before the disease burned itself out. Towns and villages in the same district might, at the same time, remain unaffected owing to the complete isolation of the stricken village. Nowadays, through the construction of roads and the considerable increase in transport facilities, few towns or villages are so remote as not to have contact with the outside world. In addition, the stories of financial reward and adventure of persons who have returned from working in the Government service, in the mines or cocoa plantations, all act as incentives to the inhabitants of distant parts to migrate and offer their labour.

### (*d*) MALNUTRITION.

17. Nutrition is probably another important factor affecting public health, although it is very difficult to assess its true importance. Reference to page 28 of this report will show that 13 out of 7,831 registered deaths were due to starvation and one to scurvy. In addition, ten deaths were attributed to pellagra and other nutritional diseases. It would be very unwise, however, to deduce from these meagre figures that malnutrition (including both under and faulty feeding) was a rare condition and the evidence available from the Government hospitals and welfare centres scattered throughout the Colony indicates a rise of nearly 20 per centum in the number of nutritional diseases seen in 1935 as compared with the figure for the previous year.

18. There is little doubt but that an appreciable proportion of the population, especially in the arid areas in the Northern Territories, suffers from some degree of under or faulty nutrition. A visit to an " ulcer " ward and to the welfare centres provides graphic evidence of this.

19. The problem is one deserving of careful investigation and can only be solved by widespread education in the right dietary, in the improvement in methods of agriculture, including animal husbandry, and in the raising of the economic level of the general mass of the population.

### (*e*) SPECIFIC DISEASES : INSECT-BORNE CONDITIONS.

#### *Malaria.*

20. Malaria continued to account for nearly one-tenth of all cases treated during the year, some 25,840 cases being recorded as compared with 24,554 in 1934. The ratio per 100,000 of all cases treated amounted to 9,599 and 9,449 in 1934 and 1935 respectively, a slight but hardly appreciable reduction.

21. Blackwater fever which is usually accepted as a *sequela* of malaria, whatever its exciting cause, showed a satisfactory decline in importance in 1935 when 17 cases with only three deaths were registered, whereas the corresponding figures for the previous year were 24 cases with 12 deaths.

#### *Yellow Fever.*

22. No outbreaks of dangerous infectious disease of any magnitude occurred during the year under review, but seven cases of yellow fever amongst Africans with four deaths were reported from various parts of the Colony proper and the Northern Territories. There is good reason to believe that this figure cannot in any way be regarded as representing the actual incidence of yellow fever.

23. The discovery of immune bodies in a Colobus monkey in the Goaso district of Ashanti during 1935 suggested the possibility of the existence of " jungle " yellow fever and the virus strain being maintained in alternative animal hosts. If this is proven the problem of the eradication of the disease from the territory, as apart from urban areas, becomes extremely difficult. An address on the subject of this malady which was delivered by the delegate from this Colony to the 2nd Pan-African Health Conference held in Johannesburg towards the end of 1935 is included as Appendix V.

## *Trypanosomiasis.*

24. Sleeping sickness once again claimed the attention of the medical and administrative authorities. Although the actual number of registered deaths fell from 116 in 1934 to 110 in 1935, it should be realised that the registration districts cover but a tenth of the population and are largely urban in character. Hence, it is quite possible that a far greater number of deaths occur from sleeping sickness than is indicated by the figure given above.

25. The statistics of cases seen in the hospitals and dispensaries form a better guide, since these serve a much wider area than the existing birth and death registration districts, more especially in the hyperendemic areas.

26. The actual number of patients treated in 1935 amounted to 3,885 or 1,778 per 100,000 cases of all diseases, a ratio of 110 per 100,000 of the general population. This compares with 1,973 cases forming 913 per 100,000 cases of all diseases or 57 per 100,000 of the general population in 1934.

27. Practically the whole of this very considerable increase is confined to the Northern Territories, the number of admissions to the two main hospitals in Ashanti, namely, at Kumasi and Sunyani, having shown a diminution.

28. At Lawra and in the Lawra–Tumu district the medical officer devoted much of his time to the work and gained the complete confidence of the people so that the number of cases treated rose from 150 in 1934 to 1,161 in 1935.

29. The popularity of the Nakpanduri field hospital in the Northern Section of Togoland under British Mandate continued to grow and admissions numbered 1,631 as compared with 1,012 in the previous year.

30. Every effort was made to maintain an adequate supply of trypanocida drugs in the treatment centres. Concurrently, strenuous efforts were made, partly with paid trained labour and—with the help of the Administration—partly with the voluntary but unskilled efforts of the local Chiefs and their people, to carry out the policy advised by the Trypanosomiasis Committee, the proceedings and conclusions of which are given in Appendix IV.

31. A certain amount of evidence was forthcoming during the year that sleeping sickness was making headway in districts other than those where it was known to be hyperendemic. When the wholesale clearance of forest for cocoa and food farms is realised, it will be readily appreciated that conditions are becoming rapidly more favourable for the breeding of the fly vector.

32. Approval has been given for the appointment in 1936 of an experienced medical officer, of a medical entomologist with considerable local knowledge and of the necessary staff of nurses, dispensers and laboratory technicians. A complete survey will be made of the Protectorate followed later by a similar survey of Ashanti and the Colony proper. When the results of the survey have been collated, it should be possible to attack the problem in a more effective manner.

34. The following table gives particulars of the increase in the number of cases of the disease dealt with in dispensaries and hospitals—including field hospitals—during the past 11 years. The figures do not include a small number of patients treated in the special infectious diseases hospitals maintained by the Health Branch primarily for dangerous diseases of the type of plague and smallpox. Actually, 40 cases of sleeping sickness with ten deaths were reported from these special hospitals for 1935 :

TABLE II.

| Year. | Cases. | Deaths. | Incidence per 100,000 of all cases treated—Medical Branch. |
|---|---|---|---|
| 1925–26 ... ... ... ... ... ... | 37 | 5 | 3·8 |
| 1926–27 ... ... ... ... ... ... | 67 | 11 | 6·4 |
| 1927–28 ... ... ... ... ... ... | 59 | 4 | 4·4 |
| 1928–29 ... ... ... ... ... ... | 94 | 18 | 5·3 |
| 1929–30 ... ... ... ... ... ... | 121 | 23 | 6·6 |
| 1930–31 ... ... ... ... ... ... | 224 | 16 | 10·5 |
| 1931–32 ... ... ... ... ... ... | 250 | 28 | 12·6 |
| 1932–33 ... ... ... ... ... ... | 685 | 45 | 33·1 |
| 1933–34 ... ... ... ... ... ... | 1,179 | 77 | 56·1 |
| 1934 ... ... ... ... ... ... | 1,973 | 112 | 91·3 |
| 1935 ... ... ... ... ... ... | 3,885 | 106 | 177·8 |

35. Seven Europeans had a trypanosome infection in 1935, the same number as in the previous year.

36. Stations, including those already referred to in paragraphs 27 and 28, where the disease occupied an important place amongst conditions treated, are listed in Table III below.

### TABLE III.

| Place. | No. of patients with sleeping sickness. |
|---|---|
| Nakpanduri ... ... ... ... ... ... | 1,631 |
| Lawra ... ... ... ... ... ... ... | 1,161 |
| Kumasi ... ... ... ... ... ... ... | 249 |
| Bawku ... ... ... ... ... ... ... | 194 |
| Tamale ... ... ... ... ... ... ... | 157 |
| Wa ... ... ... ... ... ... ... ... | 103 |
| Sunyani ... ... ... ... ... ... ... | 95 |

## (ii)—OTHER CONDITIONS.

### *Yaws.*

37. It would be impossible to mention factors affecting public health in 1935 without referring to the very large number of cases of yaws encountered, amounting to 66,748 as compared with 65,803 in 1934. Actually, the figure for 1934 represented just over a quarter of the total number of patients seen, whereas it was rather less than a quarter in the year under review. There is no doubt that this condition gives rise to much suffering and to not a little permanent disability in the form of joint and bony lesions.

38. On the other hand, it has to be admitted that the popularity of subcutaneous and intravenous medication has not a little to do with the large numbers of cases dealt with. In spite of the vast numbers referred to above, there is ample evidence that the disease is being rapidly eradicated from all urban centres and coastal regions.

### *Tuberculosis.*

39. Of all the diseases met with in the Colony, tuberculosis is believed to constitute one of the greatest menaces to the indigenous population. The problem is more fully dealt with in the Health section of this report, but it would seem desirable to give below particulars of cases treated, etc., in order to draw attention to its serious nature.

### TABLE IV.

| Year. | Cases treated. | Percentage mortality in in-patients. | Ratio per 100,000 of all cases treated. |
|---|---|---|---|
| 1932–33 ... ... ... ... ... ... | 1,227 | 38 | 511·1 |
| 1933–34 ... ... ... ... ... ... | 1,193 | 40 | 475·6 |
| 1934 ... ... ... ... ... ... | 1,269 | 43 | 496·1 |
| 1935 ... ... ... ... ... ... | 1,268 | 47 | 463·7 |

40. It should be pointed out that the figures of cases treated in no way represent the total for the Colony, since many patients suffering from the pulmonary form are removed by their relatives from hospitals where little can be done to cure the condition once it has acquired a firm foothold, and many labourers who became infected in the mining areas return to die in their home villages. Furthermore, if all cases of the pulmonary type of the disease—forming by far the greatest proportion of all varieties—could be traced, it would probably be found that considerably over ninety per centum had succumbed within two years, usually a much shorter period. Lack of immunity, mass infection, faulty nutrition and the existence of other debilitating diseases, e.g., worms, malaria, yaws, etc., all act as factors in this tragedy.

### *Pneumonia.*

41. After tuberculosis, pneumonia is probably the most important killin disease amongst those seen in the hospitals in this Colony. The actual proportion of cases rose from 497 per 100,000 in 1934 to 552 in 1935. During the same period the percentage case mortality increased slightly from 30·1 to 31.

### *Dysentery.*

42. According to the returns collated from hospitals and dispensaries the actual incidence of dysentery, most of which is of the amoebic variety, fell very slightly in 1935 from 466 to 448 per 100,000 of all cases treated. During the same period the percentage case mortality rose from 10 to 13.

43. A disturbing outbreak of bacillary dysentery due to Sonne's bacillus occurred at Achimota College, Accra, early in the year. Some fifty cases, one ending fatally, were seen amongst the kindergarten and girls school. Food infection by a carrier was suspected, but, like so many similar epidemics in more civilised countries, no absolute indication was obtained. Full details are given in the section of this report concerned with the laboratory service compiled by the Senior Pathologist.

### *Smallpox.*

44. The Colony was remarkably free from smallpox in spite of the fact that it was rife in neighbouring colonies, for example, Nigeria and Sierra Leone. This immunity is believed to be accounted for to some extent at any rate by the mass vaccination campaign which has been carried out for many years past—over 350,000 persons, equivalent to a tenth of the total estimated population, having been vaccinated in 1935 alone.

## (b) Vital Statistics.

### (I) GENERAL NATIVE POPULATION.

45. Reference has already been made in paragraph 10 of this report to the regrettable set-back that has taken place in the health of the African community and various possible causes have been discussed in the section dealing with " Factors affecting Public Health."

### (II) GENERAL EUROPEAN POPULATION.

46. Further developments in the mining industry and a considerable improvement in the general trade of the Colony resulted in an increase in the European population by 478 persons.

47. The actual distribution is seen from Table V.

TABLE V.

| | Numbers resident in 1934. | Numbers resident in 1935. | Increase or decrease. |
|---|---|---|---|
| (i) Government officials ... ... ... ... | 847 | 832 | —15 |
| (ii) Employees of trading firms ... ... ... | 1,411 | 1,500 | + 89 |
| (iii) Employees of mining companies ... ... | 952 | 1,363 | +411 |
| (iv) Missionaries ... ... ... ... ... | 281 | 274 | — 7 |
| Total ... ... ... ... ... ... | 3,491 | 3,969 | +478 |

48. In spite of this considerable influx, there were actually fewer deaths in Europeans in 1935 as compared with 1934, the figures for the two years being 16 and 17 respectively.

### (III) EUROPEAN OFFICIALS.

49. Although only one European official died in the year under review as compared with two in 1934, there was a definite deterioration in the health of the European official community as a whole—*see* Tables VI and VII below. It is noteworthy that in nearly one-fifth of the total number of days officers were on the sick list the cause was given as malaria.

## TABLE VI.

### SICK, INVALIDING AND DEATH-RATES.

| | 1934. | 1935. |
|---|---|---|
| Total number of officials resident ... ... ... ... ... ... | 847 | 832 |
| Average number resident ... ... ... ... ... ... | 599 | 594 |
| Total number on the sick list ... ... ... ... ... ... | 533 | 606 |
| Total number of days on sick list ... ... ... ... ... | 4,918 | 5,822 |
| Average daily number on sick list ... ... ... ... ... | 13·5 | 15·9 |
| Percentage of sick to average number resident ... ... ... | 2·2 | 2·6 |
| Average number of days on sick list for each patient ... ... | 9·2 | 9·6 |
| Average sick time to each resident ... ... ... ... ... | 8·2 | 9·8 |
| Total number invalided ... ... ... ... ... ... ... | 29 | 50 |
| Percentage of invalidings to total residents ... ... ... ... | 3·4 | 6·0 |
| Percentage of invalidings to average number resident ... ... | 4·8 | 8·4 |
| Total deaths ... ... ... ... ... ... ... ... | 2 | 1 |
| Percentage of deaths to total residents ... ... ... ... | 0·2 | 0·1 |
| Percentage of deaths to average number of residents ... ... | 0·3 | 0·2 |

## TABLE VII.

### INVALIDING AND DEATH-RATES.

| Year. | Average number resident. | Invalided. | Percentage invalided. | Died. | Death-rat per 1,000. |
|---|---|---|---|---|---|
| 1932–33 ... ... ... ... | 639 | 36 | 5.6 | 1 | 1·5 |
| 1933–34 ... ... ... ... | 617 | 42 | 6.8 | 3 | 4·8 |
| 1934 ... ... ... ... ... | 599 | 29 | 4.8 | 2 | 3·3 |
| 1935 ... ... ... ... ... | 594 | 50 | 8.4 | 1 | 1·7 |
| Average for period ... ... | 612 | 39 | 6 | 2 | 2·8 |

Death-rates in 1904 and 1914 were 22·8 and 20·6 respectively.

50. The causes of invalidings included the following :—

Paratyphoid fever 1, malaria (malignant) 2, trypanosomiasis 1, pulmonary tuberculosis 1, cerebral syphilis 1, chronic rheumatism 1, thrombosis 1, paralysis of facial nerve 1, glaucoma 1, neurasthenia 2, debility 4, insomnia 1, chronic myocarditis 2, haemorrhoids 1, chronic bronchitis 2, duodenal ulcer 1, gastritis 1, dyspepsia 1, chronic colitis 2, obstruction of colon 1, appendicitis 1, hernia 1, cholecystitis 1, jaundice 1, pyelitis 1, gall stones 1, urethral colic 1, hydrocele 1, furunculosis 3, ulcer 2, injury (traumatic arthritis) 1, derangement of knee joint 1, arrow wounds 1, fracture (comminuted) 2, hyperpiesia 1, sinus 1, P.U.O. 2.

One European died of acute peritonitis following perforation of the appendix.

## (IV) EUROPEAN NON-OFFICIALS.

51. As in the case of European officials so with the non-official European community there was a decrease in the death-rate, but the total number of deaths remained the same at 15 and the invaliding rate rose from 15·1 to 20·1 per 1,000. The statistics relating to the three components of the non-official community are analysed below :—

## TABLE VIII.

| 1934. | | Number. | Deaths. | Invalided. | Death-rate per 1,000. | Invaliding rate per 1,000. |
|---|---|---|---|---|---|---|
| Merchants | males | 909 | 2 | 6 | 2·2 | 6·6 |
| | females | 502 | — | 6 | — | 11·9 |
| Mining Companies | males | 928 | 12 | 21 | 12·9 | 22·6 |
| | females | 24 | — | — | — | — |
| Missionaries | males | 174 | 1 | 2 | 5 7 | 11·5 |
| | females | 107 | — | 5 | — | 46·7 |
| Totals and averages ... ... | | 2,644 | 15 | 40 | 5.7 | 15.1 |

| 1935. | | Number. | Deaths. | Invalided. | Death-rate per 1,000. | Invaliding rate per 1,000. |
|---|---|---|---|---|---|---|
| Merchants | males | 957 | 2 | 14 | 2.1 | 14.6 |
| | females | 543 | 3 | 2 | 5.5 | 3.7 |
| Mining Companies | males | 1,306 | 10 | 43 | 7.6 | 32.9 |
| | females | 57 | — | — | — | — |
| Missionaries | males | 175 | — | 2 | — | 11,4 |
| | females | 99 | — | 2 | — | 20.2 |
| Totals and averages ... ... | | 3,137 | 15 | 63 | 4.7 | 20.1 |

52. The causes in the 63 cases of invaliding comprised the following conditions :—

Typhoid fever 1, paratyphoid A. 1, malaria (malignant) 6, blackwater fever 2, amoebic dysentery 2, trypanosomiasis 2, pulmonary tuberculosis 1, haemoptysis 1, venereal disease 2, climatic bubo 1, cancer of bladder 1, splenic anaemia 1, alcoholism 2, delirium tremens 1, neurasthenia 2, temperamentally unsuited to the colony 4, nervous debility 2, debility 1, insomnia 1, choroiditis 1, cardiac incompetence 1, cardiac disease 1, myocarditis 1, thrombo-phlebitis leg 1, adenitis 1, chronic pleurisy 1, bronchitis and asthma 1, duodenal ulcer 1, gastritis 1, chronic gastro-enteritis 1, gastric carcinoma 1, chronic enteritis 1, appendicitis 2, subacute appendicitis 1, hernia 1, fistula in ano 1, nephritis 1, pyelitis 2, cystitis 1, boils 1, synovitis 1, fractured patella 1, compound fracture of leg 1, injury of foot 1, general injuries 1, granuloma inguinale 1.

53. The 15 deaths were attributed to :—

Cerebral malaria 3, blackwater fever 1, dysentery 1, haemorrhage 1, infective endocarditis 1, myocardial degeneration 2, lobar pneumonia 1, pneumonia (septic) 1, acute pharyngitis and heart failure 1, intestinal obstruction 1, general injuries 2.

## (V) AFRICAN OFFICIALS.

54. The increased death-rate of the general African population was also reflected in the sick, invaliding and death-rates of the African officials for the year covered by this report. The deterioration has taken place in spite of the definite improvement in economic conditions which the Colony enjoyed in 1934 and 1935. It may possibly be the aftermath of the economic depression which affected this community somewhat severely owing largely to the family system which exists necessitating the support of the unemployed members of the family by their more fortunate relatives.

Table IX will illustrate this set-back in the health of this important section

## TABLE IX.

### Sick, Invaliding and Death-rates.

| | 1934. | 1935. |
|---|---|---|
| Total number of officials resident ... ... ... ... ... ... | 3,756 | 3,666 |
| Average number resident ... ... ... ... ... ... ... | 3,648 | 3,540 |
| Total number on sick list ... ... ... ... ... ... ... | 1,058 | 1,297 |
| Total number of days on sick list ... ... ... ... ... ... | 11,445 | 13,229 |
| Average daily number on sick list ... ... ... ... ... | 31·3 | 36·2 |
| Percentage of sick to average number resident ... ... ... | 0·8 | 1·1 |
| Average number of days on sick list for each patient ... ... | 10·8 | 10·2 |
| Average sick time to each resident ... ... ... ... ... ... | 3·1 | 3·7 |
| Total number invalided ... ... ... ... ... ... ... ... | 30 | 25 |
| Percentage of invalidings to total resident ... ... ... ... | 0·8 | 0·7 |
| Percentage of invalidings to average number resident ... ... | 0·8 | 0·7 |
| Total deaths ... ... ... ... ... ... ... ... ... | 12 | 21 |
| Percentage of deaths to total residents ... ... ... ... | 0·3 | 0·6 |
| Percentage of deaths to average number resident ... ... ... | 0·3 | 0·6 |

## (VI) VITAL STATISTICS OF THIRTY-FIVE REGISTRATION DISTRICTS.

### TABLE X.

### Population and Rates of Registration Districts.

| | Population. | | | | | Births. | | Birth-Rate. | | Deaths. | | Death-Rate. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1921. | 1931. | | | Mid-year 1935. | 1934. | 1935. | 1934. | 1935. | 1934. | 1935. | 1934. | 1935. |
| | | Males. | Females. | Totals. | | | | | | | | | |
| Aboso ... ... | — | 3,994 | 2,587 | 6,581 | 6,581* | 133 | 128 | 20·2 | 19·4 | 220 | 241 | 33·8 | 36·6 |
| Aburi ... ... ... | — | 2,034 | 1,666 | 3,700 | 3,700* | 188 | 180 | 50·6 | 48·6 | 77 | 76 | 20·4 | 20·5 |
| Accra and Labadi ... | 41,124 | 32,833 | 27,893 | 60,726 | 69,057 | 2,827 | 2,772 | 42·1 | 40·1 | 1,514 | 1,696 | 22·6 | 24· |
| Ada and Ada Foah ... | 5,907 | 2,196 | 2,254 | 4,450 | 4,450* | 173 | 234 | 38·9 | 52·6 | 148 | 177 | 33·3 | 39·8 |
| Akuse ... ... ... | 4,145 | 1,784 | 1,874 | 3,658 | 3,658* | 78 | 95 | 21·3 | 26·0 | 66 | 72 | 18·0 | 19·7 |
| Axim ... ... ... | 3,781 | 2,367 | 2,166 | 4,533 | 4,853 | 171 | 135 | 35·8 | 27·8 | 118 | 138 | 24·7 | 28·4 |
| Bekwai ... ... | — | 2,085 | 1,654 | 3,739 | 3,739* | 186 | 193 | 49·0 | 51·6 | 77 | 74 | 20·3 | 19·8 |
| Cape Coast ... ... | 14,921 | 9,603 | 8,082 | 17,685 | 18,860 | 611 | 553 | 32·9 | 29·3 | 341 | 412 | 18·4 | 21·8 |
| Dodowa ... ... | 1,061 | 1,145 | 1,077 | 2,222 | 2,715 | 170 | 131 | 65·4 | 48·3 | 70 | 93 | 26·9 | 34·3 |
| Dunkwa ... ... | 2,005 | 1,826 | 2,134 | 3,960 | 4,791 | 128 | 121 | 27·9 | 25·3 | 140 | 145 | 30·5 | 30·3 |
| Elmina ... ... | 5,262 | 2,186 | 2,611 | 4,797 | 4,797* | 208 | 281 | 43·4 | 58·5 | 122 | 136 | 25·4 | 28·4 |
| Ho ... ... ... | 3,142 | 1,747 | 1,660 | 3,407 | 3,520 | 119 | 129 | 33·3 | 36·6 | 73 | 73 | 20·4 | 20·7 |
| Keta ... ... ... | — | 3,063 | 3,342 | 6,405 | 6,405* | 255 | 276 | 39·8 | 43·1 | 129 | 94 | 20·1 | 14·7 |
| Kintampo ... ... | — | 1,339 | 976 | 2,315 | 2,315* | 60 | 66 | 25·9 | 28·5 | 88 | 111 | 38·0 | 47·9 |
| Koforidua ... ... | 5,364 | 5,816 | 4,713 | 10,529 | 12,724 | 390 | 446 | 31·9 | 35.1 | 259 | 418 | 21·2 | 32·9 |
| Kpong ... ... | 3,285 | 1,427 | 1,477 | 2,904 | 2,904* | 87 | 90 | 30·0 | 31·0 | 64 | 79 | 22·4 | 27·2 |
| Kumasi ... ... | 23,694 | 21,219 | 14,610 | 35,829 | 40,987 | 957 | 888 | 24·1 | 21·6 | 782 | 861 | 19·7 | 21·0 |
| Nsawam ... ... | 6,143 | 4,916 | 3,966 | 8,882 | 10,046 | 213 | 159 | 21·8 | 15·8 | 208 | 210 | 21·3 | 20·9 |
| Obuasi... ... ... | 3,917 | 4,746 | 2,852 | 7,598 | 9,162 | 123 | 137 | 14·0 | 15·0 | 277 | 290 | 31·5 | 31·7 |
| Oda ... ... ... | — | 3,691 | 2,448 | 6,139 | 6,139* | 167 | 147 | 27·2 | 23·9 | 161 | 171 | 26·2 | 27·9 |
| Prestea ... ... | — | 1,667 | 822 | 2,489 | 2,489* | 126 | 130 | 50·6 | 52·2 | 175 | 175 | 70·3 | 70·3 |
| Salaga ... ... | 3,207 | 2,630 | 2,196 | 4,826 | 5,514 | 176 | 181 | 32·9 | 32·9 | 118 | 199 | 22·0 | 36·1 |
| Saltpond ... ... | 6,342 | 3,277 | 3,092 | 6,369 | 6,381 | 244 | 324 | 38·3 | 50·4 | 142 | 151 | 22·3 | 23·7 |
| Sekondi ... ... | 9,500 | 10,020 | 6,933 | 16,953 | 20,120 | 398 | 444 | 20·5 | 22·1 | 275 | 307 | 14·2 | 15·3 |
| Somanya ... ... | 3,428 | 1,213 | 1,438 | 2,651 | 2,651* | 59 | 151 | 22·3 | 57·0 | 89 | 141 | 33·6 | 53·2 |
| Sunyani ... ... | — | 1,568 | 1,243 | 2,811 | 2,811* | 92 | 133 | 32·7 | 47·3 | 121 | 145 | 43·0 | 51·6 |
| Takoradi ... ... | — | 3,393 | 2,085 | 5,478 | 5,478* | 126 | 160 | 23·0 | 29·2 | 38 | 45 | 6·9 | 8·2 |
| Tamale ... ... | 3,901 | 7,045 | 5,896 | 12,941 | 16,783 | 504 | 593 | 31·7 | 35·3 | 211 | 240 | 13·3 | 14·3 |
| Tarkwa ... ... | 2,671 | 2,012 | 1,309 | 3,321 | 3,597 | 86 | 109 | 24·3 | 30·3 | 225 | 308 | 63·7 | 85·6 |
| Winneba ... ... | 6,980 | 6,033 | 4,893 | 10,926 | 12,603 | 582 | 519 | 47·7 | 41·2 | 222 | 281 | 18·2 | 22·3 |
| Totals and "weighted averages" ... ... | 159,780 | 148,875 | 119,949 | 268,824 | 299,830 | 9,637 | 9,905 | 32.9 | 33.0 | 6,550 | 7,559 | 22.3 | 25.5 |
| † Bawku ... ... | — | 2,057 | 1,695 | 3,752 | 3,752 | — | 39 | — | — | — | 42 | — | — |
| Mampong Ashanti | 2,272 | 1,386 | 1,090 | 2,476 | 2,563 | — | 45 | — | — | — | 41 | — | — |
| Wa ... ... ... | 2,810 | 2,557 | 2,666 | 5,223 | 6,249 | — | 54 | — | — | — | 53 | — | — |
| Wenchi ... ... | 4,994 | 2,849 | 2,460 | 5,309 | 5,443 | — | 63 | — | — | — | 136 | — | — |
| Total ... ... | 10,076 | 8,849 | 7,911 | 16,760 | 18,007 | — | 201 | — | — | — | 272 | — | — |
| Grand Totals ... | 169,856 | 157,724 | 127,860 | 285,584 | 317,837 | — | 10,106 | — | — | — | 7,831 | — | — |

*In the case of towns marked with an asterisk the census population at April, 1931, is taken in lieu of an estimated mid-year population either because the population of such towns were not enumerated in 1921 or because their populations are decreasing.

†As registration was applied to these four centres during the year and as figures are not available for the complete twelve months, these statistics have not been used in computing the "weighted averages."

## (VII) TABLE SHOWING THE BIRTHS, DEATHS AND INFANT MORTALITY RATE AT SIX PRINCIPAL TOWNS.

### TABLE XI.

| Station. | 1931. | | | 1932. | | | 1933. | | | 1934. | | | 1935. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Births. | Deaths. | Infant mortality rate. | Births. | Deaths. | Infant mortality rate. | Births. | Deaths. | Infant mortality rate. | Births. | Deaths. | Infant mortality rate. | Births. | Deaths. | Infant mortality rate. |
| Accra and Labadi | 2,901 | 1,299 | 95 | 2,576 | 1,282 | 117 | 2,799 | 1,476 | 117 | 2,827 | 1,514 | 113 | 2,772 | 1,696 | 140 |
| Cape Coast ... | 489 | 319 | 85 | 480 | 359 | 83 | 562 | 353 | 103 | 611 | 341 | 76 | 553 | 412 | 110 |
| Koforidua ... | 365 | 289 | 153 | 450 | 272 | 95 | 480 | 270 | 85 | 390 | 259 | 107 | 446 | 418 | 188 |
| Kumasi ... ... | 952 | 805 | 120 | 96 | 658 | 115 | 898 | 770 | 112 | 957 | 782 | 117 | 888 | 861 | 148 |
| Sekondi ... ... | 242 | 236 | 95 | 400 | 209 | 42 | 371 | 232 | 72 | 398 | 275 | 110 | 444 | 307 | 83 |
| Tamale ... ... | 416 | 178 | 625 | 635 | 158 | 26 | 784 | 187 | 30 | 504 | 211 | 45 | 593 | 240 | 52 |
| Total ... | 5,365 | 3,126 | — | 4,637 | 2,938 | — | 5,894 | 3,288 | — | 5,687 | 3,382 | — | 5,696 | 3,934 | — |

# III.—HYGIENE AND SANITATION.

## (*a*) General review of work done and progress made.

## (I) PREVENTIVE MEASURES.

### (i) Mosquito and Insect-borne Diseases.

### (*a*) *Malaria.*

55. * Some 491 deaths were registered representing 6·3 per centum of all registered deaths, compared with 472 and 7·2 per centum in 1934. The death-rate per 100,000 persons living amounted to 154.

56. Malaria, as in past years, is again the most important and universal factor adversely affecting health, especially in the young. As a direct cause of death it does not figure very largely, but as a predisposing cause, especially in the infant, it plays a most important rôle.

It is responsible for most of the lost time and labour inefficiency, and complicates other pathological processes to a marked degree.

It requires careful exclusion before a diagnosis of other febrile conditions can safely be made.

57. The principal mosquito vectors—*Anopheles gambiœ* and *Anopheles funestus*—are nearly universally present, particularly during the rains, in the coastal area, the plains and in the area of light forest.

The effects of removing the heavy forest is typified in some of the diamond mining areas, coupled with soil removal and faulty replacement. Large areas tend to be thrown open for the benefit of *A. gambiœ.*

It is thought that heavy forest clearance plays a not unimportant part in malaria incidence in the Gold Coast, as well as with respect to other diseases—notably trypanosomiasis.

58. Of recent years not much advance has been made with regard to permanent methods of drainage, but a lot of good work has been carried out in many places, e.g. Accra, Cape Coast, Kumasi, Sekondi and Tamale in filling low-lying swampy areas of limited extent, in providing graded earth channels fed by herringbone collaterals, contour drains, vertical drainage, etc.

59. It is considered that more attention is required to subsoil methods of drainage, but before this method can more generally be adopted a local supply of cheap, agricultural tile-pipes is required.

60. In some areas tree planting in swampy areas has been carried out with effect and the Forestry and Agricultural Departments have been most helpful.

61. Spleen rates vary but little from year to year, and an average spleen rate of some 22 per centum is returned from the larger centres in the Gold Coast.

Tamale returns a rate of 20 ; Takoradi occupies a middle position with a rate of 23 ; and Koforidua a high rate of 28 per centum.

As usual, observers stress the rapid, progressive fall in the rate as the older grades of children are reached.

62. During 1935 an important forward step, with respect to the control of the worst effects of the ravages of malaria, was instituted. Quinine at cost price was made obtainable at all Post Offices throughout the country and will prove a boon to the sufferer in rural areas, often far from medical aid, and in particular to mothers so many of whom in the past could do little or nothing unaided to ameliorate the suffering of the very young.

63. This provision should do much to tide young children (often undernourished and worm-infested) over their periodic bouts of fever, and at the same time have no appreciable effect in inhibiting, or delaying, the acquisition of a degree of tolerance to the disease.

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* Statistics in this report are obtained from 35 registration areas including a total population of 317,837 out of a total population of 3,530,733 for the whole of the Gold Coast.

### (*b*) *Yellow Fever.*

64. The incidence of yellow fever from 1921 to 1935 is shown in Table XII, below.

TABLE XII.

| Year. | Cases. | Deaths. | Percentage mortality. |
|---|---|---|---|
| 1921 ... ... ... ... ... ... ... | 4 | 4 | 100·0 |
| 1922 ... ... ... ... ... ... ... | 10 | 8 | 80·0 |
| 1923 ... ... ... ... ... ... ... | 19 | 16 | 84·2 |
| 1924 ... ... ... ... ... ... ... | 8 | 6 | 75·0 |
| 1925 ... ... ... ... ... ... ... | 7 | 4 | 57·1 |
| 1926 ... ... ... ... ... ... ... | 65 | 18 | 27·7 |
| 1927 ... ... ... ... ... ... ... | 107 | 40 | 37·4 |
| 1928 ... ... ... ... ... ... ... | 2 | 2 | 100·0 |
| 1929 ... ... ... ... ... ... ... | — | — | — |
| 1930 ... ... ... ... ... ... ... | 2 | 1 | 50·0 |
| 1931 ... ... ... ... ... ... ... | 17 | 12 | 70·6 |
| 1932 ... ... ... ... ... ... ... | 4 | — | — |
| 1933 ... ... ... ... ... ... ... | 7 | 4 | 57·1 |
| 1934 ... ... ... ... ... ... ... | 2 | 2 | 100·0 |
| 1935 ... ... ... ... ... ... ... | 7 | 4 | 57·1 |

65. During 1935 seven cases occurred with four deaths. All the cases were Africans. Four of the cases occurred in the Central Province of the Colony; the remaining three cases eventuated in the Northern Territories.

66. On the whole 1935, from the viewpoint of the incidence of yellow fever, is to be considered satisfactory.

67. The term " incidence " in this connexion is intended to mean the " known " incidence, or merely those cases which come to light. The whole of the Gold Coast is an endemic area.

Mosquito control is confined to the ports, the larger centres and some of the larger villages and towns on certain of the important trade routes.

The rest of the country is more or less a " closed book " ; an outbreak may, or may not, come to knowledge.

The complete picture is rather like that within the crater of a volcano. The whole contents may be actively molten, but it is only where the gas bells burst on the surface (i.e. the isolated outbreaks which come to knowledge) that any indication of the real state of affairs can be appreciated. Only in three centres in the Northern Territories can efficient mosquito control be said to exist.

68. In the controlled centres inspections are organised so that all premises are inspected once in every seven to ten days. These routine inspections are controlled by means of " cross " and " check " inspections as far as possible. " Dry-pot " parades are valuable in controlling domestic-breeding in cantonments, police lines and institutions. The result of the total inspections carried out by officers of the Health branch are shown below.

TABLE XIII.

| Number of inspections. | | No. of premises with larvae. | | Larval index. | |
|---|---|---|---|---|---|
| 1934. | 1935. | 1934. | 1935. | 1934. | 1935. |
| 1,929,507 | 2,262,565 | 6,275 | 11,880 | 0·32 | 0·52 |

69. The majority of the villages and the smaller rural towns, many of which are situated on busy trade routes and cluster round the larger centres and mining areas, cannot of a necessity be inspected with regard to the breeding of domestic mosquitos. Control requires to be extended. Public memory is short, and less and less general help is afforded to the Health branch until another outbreak occurs when the necessity for domestic mosquito control is once more forcibly brought before the general public.

70. In the larger centres, where full control can be exercised, the breeding of domestic mosquitos can be kept well within bounds. In these places, although sporadic cases of yellow fever are always possible—either imported or indigenous—epidemic outbreaks of the disease are not to be apprehended.

71. In those places, villages and small towns, where control is partial or non-existent, outbreaks may occur at any time. In such places, even if the strictly domestic larval index is low, the carelessly-thrown-out tin, bottle, gourd, snail-shell, etc., lying hidden in grass or bush overgrowth readily fills with water and acts as an ideal " nursery " for *Aedes aegypti.*

The bottle and tin-strewn overgrown perimeters of these smaller centres are a danger of the first order and one that is becoming increasingly difficult to deal with.

72. The anxiety felt for the large number of European mining prospectors scattered everywhere throughout the country in uncontrolled rural areas, and often working in the old mining areas frequently containing masses of old water-retaining machinery, bottles, etc., now concealed in bush overgrowth, has so far not been realised. The danger, however, still exists and will continue until the mining industry stabilises and settles down in controlled mining areas. Early in 1935 a medical officer was called to see a sick European miner prospecting in the bush in the Western Province of Ashanti. This case died without a diagnosis of yellow fever being made. The medical officer and a European companion of the man who died both developed febrile attacks, and later it was found that samples of their blood sera yielded positive protection tests. It can, probably, be assumed that they both suffered from yellow fever at that time.

73. The racial incidence and case mortality is shown in Table XIV below.

TABLE XIV.

| | Colony. | | | Ashanti. | | | Northern Territories. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cases. | Deaths. | Mortality. % | Cases. | Deaths. | Mortality. % | Cases. | Deaths. | Mortality. % |
| African. | | | | | | | | | |
| Males ... | 3 | 2 | 33·3 | — | — | — | *2 | 1 | 50 |
| Females ... | 1 | 1 | 100·0 | — | — | — | †1 | — | — |
| Total ... | 4 | 3 | 75·0 | — | — | — | 3 | 1 | 33·3 |

* One case clinically diagnosed, this case recovered.
† Diagnosed clinically, recovered.
It was not possible to obtain blood samples for protection tests in either case.
It will be noted that no Syrian or European case occurred during the year.

74. Preventive measures undertaken throughout the year briefly may be summarised as follows :—

(*a*) Organised inspections and control of the breeding of domestic mosquitos in the large centres, ports and some towns and larger villages on the more important trade routes.

(*b*) The living of European officials in well-controlled residential areas protected by building free zones, and the encouragement of European trading firms to take up building plots in these areas and house their European staff under comparatively safe conditions. Past experience has well proved the value of these areas, and this provision must still be considered as being the most important factor in the maintenance of European health in West Africa.

The experiment of allowing servants' wives to live in the servants' quarters attached to official bungalows has been tried out during the past six months, one wife being allowed per servant—provided no insanitary overcrowding exists and that a mosquito-net is provided. Residents wishing their servants' wives to live on their premises are required to obtain a permit from the local medical officer of health.

Laxity on the part of certain Europeans in applying for the necessary permits has led to considerable trouble.

(c) The value of protective inoculation has been kept well before Europeans, both of the official and trading community. A number have responded. In the present stage of development of the Gold Coast and under existing sanitary conditions, every European coming to the Gold Coast, whose duties take him outside the larger centres, should be protected for many years to come.

75. Arrangements are well under way for the establishment of " anti-amaryl " aerodromes at Accra and at Takoradi. So much has been written—often of an alarmist nature—with reference to the possibility of the spread of yellow fever through the agency of aerial transport, that little can be added. It is considered, however, that a greater danger exists in the probability of a steady spread of the infection in a south-easterly direction along road-traffic routes. Countries in West Africa are steadily being opened up and the road systems of one country, as the years pass, become more closely linked up with those of neighbouring countries. The steady spread of infection by slow stages along land trade routes would appear to be the most important of all methods of extension from the West African endemic area.

It is harder by far to control than aerial transport ever can be, and little, if anything, has ever been attempted save in limited areas during epidemics and for short periods of time only.

76. Whether a " bush " type of yellow fever exists in the Gold Coast, carried by a vector other than *Aedes aegypti*, cannot be stated. Certain sporadic cases are at times hard to explain, but no epidemic has yet occurred where it was necessary to implicate any other carrier than *Aedes aegypti*.

77. The danger of the tree-breeding of mosquitos is well recognised, and a Tree Committee has been approved for Accra under the chairmanship of the Conservator of Forests, to deal with all the problems of tree planting and tree " surgery ".

### (c) *Filariasis.*

78. A few cases are reported from most stations, but up to the present this condition has proved of little moment, except to the sufferer, and has called for no special remedial precautions save those as briefly outlined in the preceding paragraph.

### (d) *Dengue.*

79. Sporadic cases arise from time to time, but very rarely does this infection assume anything approaching an epidemic incidence.

### (e) *Trypanosomiasis.*

80. This disease continues rightly to cause considerable anxiety. During 1935, 110 deaths were registered as due to trypanosomiasis as compared with 116 registered during 1934. The death-rate per 100,000 living population was 35 as compared with 40 for 1934. It will be understood that most of the deaths from trypanosomiasis must occur in areas to which death registration does not apply.

Remedial operations have been undertaken on a comprehensive scale, and arrangements have been made for an extensive survey of the whole question. Until this survey has been completed operations will be under the control of the Research branch. It is not intended, therefore, to discuss the question in this section of the Annual Report at any length.

81. Two points, however, may well be stressed. The first is to what extent are we opening out fresh tracts of tsetse country by forest clearing resulting in the growth of secondary bush and the formation of savannah ? The second is a plea that the trypanosomiasis question should not distract attention from diseases such as tuberculosis, which in the towns and increasingly so in rural areas, has taken its toll for years and will continue to do so in the future, requiring the most strenuous efforts in the improvement of housing conditions and the elevation of the general standard of environmental sanitation for its control.

82. Trypanosomiasis is no new disease to the Gold Coast ; cases if carefully looked for could often be found in the Colony as well as in Ashanti and the Northern Territories.

83. Tsetse has always abounded in many areas. It will be found, it is thought, that the percentage of infected flies has risen in many localities, and that the main factor is the human element, i.e., the infected immigrant. Trypanosomiasis has now been added to the schedule of " infectious diseases."

## (ii) Epidemic Diseases.

### (*a*) *Plague.*

84. No case of plague was reported during the year.

The threat of plague to the Gold Coast ports, however, is very real, particularly in the case of Takoradi where ships come alongside the quay.

85. During the year 97,060 rats were caught in ports and inland places.

Of these a representative proportion was subjected to bacteriological examination and no plague-infected rat was found.

This trapping can have little effect on the rat population, but it does produce a sufficient number of rats for examination, and it trains a staff capable of observing any undue rat mortality ; also, the trapping of rats on private premises serves as a good basis for the insistence of efficient rat-proofing on the part of the owners.

86. As in the past chief reliance has been placed on rat-proofing and building rats out of premises, and the proper protection of foodstuffs. Much, however, remains to be done in the rat-proofing of stores, warehouses and cocoa sheds in the larger centres and in the port areas. Financial stringency in the past has slowed down progress, but on the return of a measure of prosperity this work should go ahead.

### (*b*) *Cholera.*

87. Up to the present cholera has not made its appearance in the Gold Coast.

### (*c*) *Smallpox.*

88. No cases of smallpox have been reported during the year, although in most of the neighbouring West African countries extensive epidemics have occurred.

Lanolinated lymph to the cost of £2,202 has been purchased from the Lister Institute, and the details of the vaccinations performed are shown in the following table :—

TABLE XV.

| | 1934. | 1935. |
|---|---|---|
| Total persons vaccinated ... ... ... ... | 338,099 | 353,192 |
| Number verified successful ... ... ... ... | 73,606 | 120,019 |
| Percentage successful ... ... ... ... ... | 73 | 85 |

89. The staff of 12 public vaccinators are posted at strategic points, e.g., the ports, large centres, and ferries. Most of the Health branch staff are trained in vaccination and these officers can be called upon, as occasion requires, to fulfil the duties of assistant public vaccinators.

### (*d*) *Enteric Fever.*

90. Some twenty-one deaths from diseases of the enteric group were recorded during the year, as compared with fifteen during 1934. The death-rate per 100,000 living was 6·6.

91. The total deaths recorded for 1935 are not high, but it is considered that the total case incidence in the general population must be considerable.

92. Continual endeavour was made to protect water supplies, and to ensure the provision of proper methods of refuse destruction and sanitary latrine accommodation in urban rural areas. Large areas, however, almost completely lack such facilities, and insistence on their provision presents difficulties on account of staff shortage and the deficiency in rural health legislation covering these desiderata.

93. A certain number of Europeans took advantage of inoculation against diseases of the enteric group, but as a rule Africans remain apathetic.

### (*e*) *Dysentery.*

94. Diseases of the group " dysentery, diarrhoea and enteritis " took the third place in the list of killing diseases ; 741 deaths were registered during 1935 which yields a rate per 100,000 persons living of 233, and a percentage of 9·5 to all registered deaths.

95. The amœbic form of the disease is approximately twice as high as the bacillary form, and would point to the probability of a fly-borne source of infection.

96. Diseases of this group are considerably higher in backward rural areas than in the larger centres. In such areas refuse disposal is almost universally faulty, and if latrines exist—which often they do not—they are of primitive, insanitary design and of faulty construction.

97. Not infrequently towards the end of the dry season, or after the first rains, diseases of this group affect a village in almost epidemic form ; the brunt of the attack chiefly involving the younger members of the community.

98. The methods of prevention include the provision and protection of water supplies, the organisation of an efficient form of refuse disposal and the provision of an adequate number of sanitary latrines.

### (*f*) *Cerebro-spinal Meningitis.*

99. The Gold Coast has been completely free of this disease, no deaths having been reported during 1935.

Improvements in house construction providing more effective ventilation, the substitution of the louvred window for the shutter, and the lay-out of towns and villages all combine in obviating the occurrence of this disease.

### (*g*) *Relapsing Fever.*

100. Relapsing fever has not appeared among the deaths registered during 1935, no deaths having been recorded. The tens of thousands of immigrant labourers deloused at the Tamale and the Kumasi disinfesting stations have very largely diminished the occurrence of this disease which formerly broke out year after year among the large population in the Kumasi Zongo, and frequently yielded a large number of cases and a considerable number of deaths.

### (*h*) *Yaws.*

101. The total number of cases of yaws treated at the welfare centres during the year were 5,760 or 7·5 per centum of all cases attending.

102. Indigenous yaws is rarely seen in the larger comparatively well-sanitated centres. It is generally a disease of the more backward rural areas, and very largely depends on the standard of sanitary excellence in any particular place.

103. In 1929–30 yaws cases formed 24 per centum of all cases treated at the welfare centres. By 1933–34 the percentage had fallen to 12·5. It is not at all improbable that the present fall in the standard of rural sanitation may be reflected in a rise in the incidence of yaws in the next few years.

104. Prevention chiefly consists in the treating of cases in the infective stage and the general elevation, in so far as is possible, of all conditions of environmental sanitation.

### (*i*) *Diphtheria.*

105. Diphtheria has now been added to the list of infectious diseases. In 1935 no deaths were recorded but a small outbreak occurred in Accra which made it necessary strictly to control the movements of both cases and contacts.

This infection is believed to be commoner than once supposed.

## (iii)—OTHER DISEASES.

### (*a*) *Leprosy.*

106. Owing principally to staff shortage nothing useful has been added in recent years to our knowledge with respect to the incidence of this disease. The Census Report for 1931 enumerated some 5,000 lepers. It is usually accepted that the general incidence of this disease is in the region of 1·5 to 2 per mille of the population. The relative density of the disease increases as one proceeds north.

107. The leper settlements at Accra, Ho, Kumasi, Sekondi and Yendi continued to function during the year. Ho is the principal settlement. In it some 308 lepers are accommodated.

108. As a rule the lepers who are willing to enter one of the settlements are very advanced cases—some even " burnt-out ". There is an indication, however, that lepers in the early stages of the disease are coming forward for treatment in greater numbers.

109. Lepers found during routine inspections living in compounds and houses with well persons, and who are not willing to undergo voluntary segregation are given advice as to their living in isolated rooms and using separate feeding utensils and bedding. The same advice is stressed to the owner of the house. A certain degree of isolation is often obtained in this way ; and in some instances such advice is well observed.

110. Treatment generally consists in the exhibition of Alepol or Moogrol and the treatment of inter-current diseases and infestations. Protein shock has been found useful in a certain number of cases.

### (*b*) *Tuberculosis.*

111. Tuberculosis was responsible for 867 deaths. Of this total 220 deaths were females and 647 males. The deaths from tuberculosis represented 11·1 per centum of all deaths registered. The rate per 100,000 persons living for all forms of tuberculosis was 273. In 1934 a total of 695 deaths were registered, giving a percentage of 10·6 and a rate per 100,000 persons living of 237.

112. The pulmonary form constituted over 90 per centum of all forms of the disease.

113. As a " killing " disease entity, tuberculosis takes pride of place, and is only exceeded by the combined disease category of " pneumonia, broncho-pneumonia and bronchitis ". It is unnecessary, therefore, to stress its importance.

114. The disparity between the number of female and male deaths is capable of ready explanation. The majority of the male deaths occur in the 25–45 age group on which the " " heat and burden " of the day falls. These men are usually of the labouring class, they are often undernourished and live in overcrowded, insanitary conditions. They are subject to overstrain and exposure to a high degree.

115. Whether tuberculosis is generally on the increase is hard to say. Tuberculisation of the community in the populous centres is believed to be considerable and it is possible that a degree of resistance may be in the process of being acquired. Generally, resistance to the infection is practically non-existent. In the more rural areas it is thought that tuberculosis is on the increase : in such areas, however, death registration does not apply. Most of the labour is drawn from these areas and the returning, tuberculous ex-worker must do much to spread the disease in his community.

116. Undoubtedly the deep mining industry influences the problem. To what degree, it is difficult to sum up for the mine labourer is not compounded and, usually, on the first signs of the establishment of the disease he leaves the mine. Frequently, after a stay of varying period in some overcrowded and insanitary local village, he proceeds back to his country to die before he arrives home.

117. The causes for this high death-rate are not difficult to find. Resistance is low, if existent, undernourishment is common and the general dietary is not a well balanced one, housing conditions more often than not are deplorable and overcrowding is rife, the spitting habit is universal and ignorance of the rudimentary laws of health is widespread.

118. The prevention of tuberculosis can briefly be summarised under three heads :—

(*a*) The all-round improvement in general environmental sanitation, with particular reference to housing and overcrowding. A much better type of house is being erected in most of the larger centres on systematic lay-outs, but the majority of such centres show extensive areas occupied by overcrowded " rookeries." The question in rural areas, also, presents difficulties, Progress in such areas must be slow, and to a great extent depends on education and example.

(*b*) The steady extension of lay-outs in rural and township areas.

(*c*) Education of the people in the rudimentary laws of health preservation, with particular stress on the spitting habit and the necessary provision of adequate ventilation, the avoidance of overcrowding, etc. Such education takes time and promises best when applied to the school-child.

119. The future of tuberculosis in the Gold Coast resolves itself into a race between sanitation in its widest application and the disease. Tuberculosis is not a showy " tropical " disease and for this reason may fail to receive the public attention it merits. It is capable of killing throughout the length and breadth of the Gold Coast, and from a health standpoint is the most important problem for the future.

### (c) *Pneumonia.*

120. Diseases of the " pneumonia, broncho-pneumonia and bronchitis " group are responsible for the largest total of deaths. In 1935, 1,300 deaths were registered as due to diseases of this important group. The ratio per thousand deaths was 166 as compared with 150 and 158 for 1933 and 1934 respectively.

121. The causes and methods of prevention are as outlined in the preceding paragraph.

122. The underground worker is particularly prone to attack, and several of the deep mines have now instituted good bathing facilities near the shaft-head with laid-on warm water and dry clothes lockers.

123. As in previous years it is the male that is chiefly affected and, usually, members of the 24–45 years age group.

124. From a general prevention standpoint diseases of this group have a peculiar importance in the diagnosis and exclusion of the more important infectious diseases. When persons die in the early septicaemic stage of pneumonia, which they may do very suddenly, it is often difficult to exclude, even at post-mortem examination, such diseases as plague and yellow fever.

## (IV) HELMINTHIC DISEASES.

### (a) *Ankylostomiasis.*

125. In 1935, twenty deaths, only, were recorded as having been due to ankylostomiasis.

This infestation in the Gold Coast, apparently, has little effect on the mortality rates, but must have a considerable predisposing effect with respect to other diseases by the lowering of resistance.

126. The infestation is common to a minor degree, but clinical manifestations of the diseases are not frequently seen. If the Gold Coast was visited by periodic famine it is thought that the picture would be a different one.

In the deep mining industry ankylostomiasis does not figure as an important factor, three deaths only being credited to this disease ; but the observations with reference to the lowering of the resistance in the first paragraph of this section applies to a considerable degree.

127. Prevention consists in obtaining as satisfactory a system of night-soil disposal as possible. This is difficult in the rural districts over large areas of which no satisfactory system of communal latrines exist and the provision of such is impossible to enforce.

128. In the deep mines an adequate number of latrines of a sanitary design are insisted on, their frequent disinfection, the removal of the night-soil to the surface for disposal, the draining away of standing water, the removal of liquid mud and the treatment of the floors and surroundings of the latrines with a 20 per centum solution of rock salt, or disinfectant solution, briefly summarise the preventive measures taken.

### (b) *Ascariasis.*

129. This infection is almost universal and its importance is stressed from all welfare centres and from many stations.

130. The harmful effects of ascariasis fall chiefly on the very young, and it is difficult to exaggerate these.

131. The provision of sanitary latrines and systems of night-soil disposal, and educational propaganda in the schools and in the homes of the people are the chief methods of control.

### (*c*) *Taeniasis.*

132. Taeniasis is widely spread throughout the Gold Coast and is commonest in those areas where public latrine systems are non-existent and the lack of fuel renders the proper cooking of meat a difficulty. Such conditions are not infrequently met with in the north.

133. The chief methods of prevention are the guarding against indiscriminate fouling of the ground by the provision of a sanitary system of public latrines (this provision, as stated previously, is difficult to ensure and often impossible), the careful disposal of night-soil, the control of slaughtering, the care of slaughter-houses and slaughter-slabs, and the systematic inspection of meat where possible.

### (*d*) *Dracontiasis.*

134. Dracontiasis is a very common infestation of backward rural areas where water supply presents difficulties. It is very rare in the larger centres except as an imported case.

135. In localities where the infestation is common water is usually scooped up from shallow water-holes, ponds and even puddles, and in the dry season conditions of water famine prevail.

136. The people are not slow to incriminate their water supply as the source of the trouble. The Ashantis are usually very willing to work hard themselves in improving the local supply when expert advice is available. In the Colony the people as a rule are apathetic.

137. Preventive measures consist entirely in providing a well protected water-supply. Wherever possible this consists of water delivered through short lengths of iron-piping from concrete, spring or river-fed, collecting tanks, or, in areas where conditions are not so favourable, from well protected wells.

### (*e*) *Schistosomiasis.*

138. During 1935 six deaths were registered as due to schistosomiasis. This infestation is not so common as the preceding helminthic infestations. It, however, has a fairly wide distribution, and it is considered to be commoner than supposed.

139. The importance of schistosomiasis is stressed from stations in the Eastern and Central Provinces of the Colony and from localities in Ashanti.

140. The condition is often ignored by the sufferer who, not infrequently, erroneously associates it with gonnorrhoea—a very common complaint.

141. Methods of prevention consist in treating those suffering from the infestation, the careful disposal of excreta, and the draining of collections of water inhabited by the mollusc host—often a difficult or impossible undertaking when wide areas have to be dealt with. Stress has again been laid on the planting of *Balanites aegyptiaca* to control such areas.

### *Animal Diseases.*

142. The outstanding event of the year was the sporadic appearance of canine rabies practically throughout the length and breadth of the Gold Coast. Towards the end of 1935 an application was made to Government that the whole of the Gold Coast should be declared an infected area.

143. A very full report has already been submitted for the information of the Secretary of State, and, to avoid repetition, only a brief summary will be given here.

144. There can be little doubt, but that an extensive outbreak occurred in the dog population towards the end of 1934, particularly in the Eastern Province of the Colony.

145. In February, 1935, three Africans and two Europeans were bitten by a rabid dog at Nsawam in the Eastern Province of the Colony.

146. The first human case occurred at Nsawam—an African girl aged 10 years. She received anti-rabic treatment (light) but developed symptoms 65 days after she was bitten and rapid death followed.

147. The second human case, an African boy aged 12 years living in Accra, died on the 19th of April—38 days after he was bitten. He received one dose of anti-rabic vaccine, only, further treatment being refused.

148. The third human case, an African boy aged 6, living in the same compound as the previous case and bitten at the same time, developed symptoms 89 days after his bite and died three days later. He was not brought for treatment.

149. The above three cases represent the total human cases which came to light. Considering the wide extent of the infection in the canine population and the large number of persons, both African and European, bitten there is good cause for congratulation that this small total has not been greatly exceeded.

150. As a general rule the symptoms in dogs have been atypical.

151. The question of a natural reservoir of infection has not been solved satisfactorily. The hyaena in the north is probably a factor ; but is it really necessary to look further than the prolific, mangy, neglected, ubiquitous pi-dog of the African village ? General control is, of course, not possible, and dogs invade the centres, where control is possible, again and again.

152. Thousands of dogs have been destroyed and the work proceeds.

153. During the last two months of 1935 signs were not wanting that the incidence in the canine population was abating. It is too soon, however, to come to a definite conclusion. Sporadic cases are likely to occur over a considerable period still.

154. During the year extensive stocks of anti-rabic vaccine were to hand, ample for all emergencies.

155. Anti-rabic immunization of dogs is not yet generally available. A small supply of vaccine was obtained from Lagos and a small batch of valuable dogs were immunized. It is hoped in the near future to have a locally made supply of vaccine available for the treatment of all dogs in the larger centres.

156. Contagious bovine pleuro-pneumonia has been reported, and sporadic cases of epizootic lymphangitis.

157. A fatal human case of anthrax was reported from Salaga in the Northern Territories.

158. The Principal Veterinary Officer reports that numerous cases of trypanosomiasis occurred among horses, cattle and smaller domestic animals during 1935 ; owing to the concentration of the rainfall and the rapid rise of the rivers, the riverine tsetse-flies were driven out more quickly and spread more generally than usual.

159. The Principal Veterinary Officer stresses the high incidence of cysticercus bovis in " garbagemongering " cattle in the Tamale area and makes a plea for adequate village latrine accommodation.

160. At all large centres records are kept of parasitic and pathological conditions found at the local slaughter-houses.

### *Seasonal Prevalence of Diseases.*

161. Little can be added to the comments of previous years. The seasonal prevalence of diseases is not a marked feature in the Gold Coast.

## (II) GENERAL MEASURES OF SANITATION.

### (*a*) *Sewage Disposal.*

162. The European Hospital, Accra, has now been provided with a water-carriage unit with septic tank and aeration bed. This long overdue provision has proved most satisfactory and welcome.

163. A new tipping depot for the sea disposal of night-soil at Sekondi was commenced and was nearing completion at the end of the year. This provision was urgently required.

164. There is a growing tendency for the owners of private residences to install water-carriage and septic tank disposal systems. Every encouragement has been given to further this advance in night-soil disposal. Care has had to be taken to prevent dangerous soil pollution, but the cheapening of such installations has been discussed and a modified plan on a simpler and cheaper system for bungalows, situated in other than built over areas, is in process of being produced.

165. Septic tank latrines were installed at various centres and on the whole these have proved satisfactory. Local methods of cleansing, however, are not adapted to this type of latrine, and it will take education over a considerable period to remove this drawback.

166. On the whole the conservancy systems run in certain townships by unofficial sanitary committees have functioned fairly well, but the life of these committees is uncertain and the organisation of the conservancy systems is liable to break down at any time.

167. The establishment of satisfactory public latrine systems, usually of the pit variety, in the rural areas is becoming increasingly difficult to obtain. Advice and suasion are but " broken reeds " when apathy and lethargy have to be contended with.

168. Promiscuous fouling of the perimeters of villages is fraught with the highest danger to infant life and the well-being of cattle. The children are, practically, in every case, infected with malaria. On this infection is added heavy ascaris infestation. The chances of recovery of a child thus handicapped, and often on an unsatisfactory dietary, when attacked by a bronchitic or intestinal infection are slender.

### (*b*) *Refuse Disposal.*

169. During 1935 no alterations in pre-existing methods can be reported.

170. A " barless " incinerator has been elaborated, which has proved useful and economical in that it has obviated the transmission about the country of heavy cut rails for incinerator beds.

### (*c*) *Drainage.*

171. During 1935 expenditure was chiefly concentrated on the maintenance and repair of existing concrete drains.

In Kumasi 3,220 linear yards of concrete drains were constructed and 503 linear yards of concrete culverts.

172. Several stations report the extension of the local earth-gutter drainage systems and an increased area under anti-mosquito drainage control.

173. Earth gutter systems are extremely expensive to maintain, falls are frequent and many pot-holes are scoured-out. To illustrate the extent of some of these systems mention may be made that in Tamale alone some 30 miles of such earth drains require maintenance and attention.

### (*d*) *Water Supplies.*

174. The pipe-borne water supplies at Accra, Sekondi–Takoradi, Cape Coast, Winneba, Tamale and Kumasi functioned satisfactorily during the year.

175. A disconcerting growth of " water cabbage " appeared on the surface of the Owabi (Kumasi) reservoir which necessitated extensive removal of the growth. The quality of the water was not affected.

176. Advice and assistance were afforded to certain villages in Ashanti in the improvement and protection of their water supplies.

177. Extensive inquiries were instituted into the quality of the water in various mining areas with a view to improvement.

178. It is recorded with much satisfaction that Government has decided to extend, in 1936–37, the pipe-borne water supply from Cape Coast to Elmina and Saltpond, and to proceed with the first part of the scheme for providing a pure supply of pipe-borne water for Koforidua. These formed one of the principal of the recommendations in last year's report. The first part of the Koforidua scheme envisages the bringing of an ample supply of screened and chlorinated water to a central point in the town to be followed later by more general distribution.

179. Such towns as Tarkwa and Salaga have urgent claims for the provision of pipe-borne water schemes.

180. In many areas in the Northern Territories much hardship results owing to the shortage of potable water. A comprehensive investigation is due to be completed at an early date.

181. Chemical and bacteriological examinations of water were carried out as required during the year.

182. Of 153 samples taken of the Accra water after treatment 86 per centum did not produce B.coli in 100 cc. or less. Of 52 samples taken from points of distribution none revealed the presence of B.coli ; an excellent record.

183. Of samples taken from points of distribution at Takoradi and Sekondi 17 per centum yielded B.coli in 100 cc. or less.

### (*e*) *Clearance of Bush and Undergrowth.*

184. There is little to be added to former reports with reference to this important measure. In the larger centres shortage of labour prevented as large an area as desired to be kept clear.

185. It is becoming increasingly difficult to ensure that a properly cleared area is provided round villages and smaller rural towns both in the Colony and Ashanti.

186. Considerable progress was made in anti-tsetse clearing round certain villages, fords and water-holes in the Protectorate and in the Northern Section of the British Sphere of Togoland.

### (*f*) *Domiciliary Visiting and Inspections.*

187. Practically every officer of the Health branch takes part in this important measure. In 1935 house-to-house inspections were carried out to the number of 2,262,565. During 1934 these inspections totalled 1,929,507.

188. In addition to the total shown in the preceding paragraph much valuable visiting was carried out by health visitors, Red Cross sisters, midwives, voluntary workers and sisters attached to mission dispensaries.

189. Details of the results of official inspections in six large centres are shown in the following table:—

TABLE XVI

| Town. | Convictions for mosquito larvæ. | Fines for larvæ. | Convictions for insanitary conditions. | Fines for insanitary conditions. |
|---|---|---|---|---|
| | | £ s. d. | | £ s. d. |
| Accra ... ... ... | 399 | 180 5 0 | 2,009 | 340 11 6 |
| Cape Coast ... ... | 321 | 89 11 6 | 519 | 74 15 6 |
| Koforidua ... ... | 208 | 53 8 6 | 787 | 116 15 0 |
| Kumasi ... ... ... | 355 | 93 3 0 | 3,059 | 609 8 0 |
| Sekondi ... ... ... | 54 | 26 15 0 | 405 | 97 13 0 |
| Tamale ... ... ... | 222 | 21 18 0 | 262 | 13 3 0 |
| Total ... ... | 1,559 | 465 1 0 | 7,041 | 1,252 6 0 |

190. For the whole of the Gold Coast a total of 31,751 convictions were obtained for nuisances and mosquito larvæ.

In 24,390 convictions for insanitary conditions the fines imposed totalled £3,861 14s. 11d. The fines resulting in 7,361 convictions for mosquito larvæ reached a total of £1,866 19s. 7d.

### (*g*) *Offensive Trades.*

191. Offensive trades are not a very important factor in the Gold Coast. Fish curing, hide curing and dyeing practically complete the list.

192. Of these offensive trades only fish curing, or smoking, can be considered as anything like extensive. It is, more or less, confined to the seaboard, where in the large centres it is controlled—operations being allowed only in certain areas.

Fish improperly cured on the coast may sometimes be found undergoing a second smoking process far inland.

## (III) SCHOOL HYGIENE.

193. Nothing in the form of a school medical service is in existence. All medical officers of health keep in as close contact with the schools in their areas as they can, but regular mass inspection of scholars, with the present staff, is not possible.

194. There can be no denial but that conditions, generally, in the schools have considerably improved from those obtaining—say twelve years ago. Conditions of overcrowding, defective ventilation and lighting and lack of sanitary latrine accommodation frequently are still come across.

195. The Health branch owes a debt of gratitude to the inspecting officers of the Education Department, who lay great stress on conditions affecting health during their periodic visits of inspection to the schools.

196. The average splenic index for the schools in the larger centres is some 22 per centum.

## (IV) LABOUR CONDITIONS.

197. There can be little doubt, it is thought, but that immigration over the land frontiers continues unabated, and there is evidence that this immigration has, during 1935, been more determined than ever. The medical officer of health, Kumasi, reports from 2,000 to 4,000 immigrants *per mensem* passing through a single road-control station into that centre. There is, also, some evidence to prove that this immigration tends to show a more permanent character, i.e., women and children are sometimes included.

198. Demand for the employment of labour has improved in the Gold Coast, but is not commensurate with the inflow.

199. The majority of these immigrants are from French Territory, and their numbers are impossible to gauge.

200. The newly arrived immigrant is usually, in poor condition, undernourished and frequently diseased. This factor has seriously to be taken into account when trypanosomiasis is considered.

201. Steady employment and regular pay makes an extraordinary and rapid change in their condition. Some arrive from the north in a condition unfit for work, and these are looked after until fit in the " Refuges " in Tamale and Kumasi.

202. Immigrant labour may seek work in employment capable, roughly, of sub-division into two categories—organised and casual.

203. Organised labour includes labour employed on the mines and in connection with the shipping industry in the vicinity of the ports.

204. The labour gravitating to the mines receives enhanced pay, but at the same time runs increased risks. As he is not " compounded " it is not easy to trace his future history.

205. Of the labour taking up work in connection with the shipping industry, i.e., as boat boys, most appear in the Gold Coast as entrants at the ports from the Kru Coast. These, however, seem to be falling off in numbers, and an increasing number of recruits appear to originate from such places in the Gold Coast as Elmina and Saltpond. The Medical Officer of Health, Takoradi, reports a high pneumonia rate among these labourers.

206. During 1935 very little labour was absorbed into public works and taken up by private contractors.

207. Of the casual labour some obtain employment in the cocoa farms being paid in money, and in kind. Others are to be found round lorry parks up and down the country doing casual portering.

208. These casual labourers are a source of a good deal of anxiety to the authorities. They take up no fixed abode and spend none of their takings in rent. They live anywhere. Their physical condition does not improve much, if at all, during their sojourn. They save every penny possible and, when they deem they have made sufficient, they depart for their homes.

209. Considerable unemployment still exists and a good deal of hardship. The " family " and " tribal " systems to a certain extent help to mitigate some of the worst effects, but under these systems the wage-earner tends to suffer equally with the recipients of his bounty. Wages are on the low side. Rents and the cost of living in the larger centres are high.

210. During 1935 thirteen deaths were reported as due to starvation, compared with 15 in 1934.

## (V) HOUSING AND TOWN PLANNING.

211. It is satisfactory to be able to record that increasing prosperity has had a definite stimulus to house building.

212. In Accra in 1934 twenty-six houses only were completed. During 1935 ninety-two buildings were completed, valued at £48,000. Building permits to the number of 263 were issued, valued at £172,900.

213. It has been pointed out previously that 10 per centum of the total inhabitants of Accra live in congested slum areas. The social survey undertaken by the Accra Division of the Red Cross Society was completed in in 1935, and a report and rehousing scheme, estimated to cost some £70,000, was submitted to Government for consideration. Most of the older centres—notably Sekondi and Cape Coast—can also show considerable areas of slum.

214. Several lay-outs were drawn up for various townships and certain extensions of existing lay-outs were made. Most of these were of rapidly growing towns in connection with mines. It is reported from Tarkwa that every plot in the commercial part of the town has been taken up.

## (VI) SANITATION IN THE MINES AREAS.

215. Owing to staff shortage and sickness the mines area was, for a part of 1935, without an inspecting officer. The addition of a third senior health officer to the strength of the Health branch staff has considerably eased matters.

216. The standard of sanitation in, and in the vicinity of, mining areas is lamentably low. This observation refers particularly to housing and is applicable more forceably to the privately-owned house.

The Senior Health Officer, Mines Areas, reports :—

> " The provision of adequate housing by the mines for their African labour is of paramount importance. The aim of each company should be completely to rehouse its labour in well laid-out and well-built sanitary villages. Most of the companies have already tackled this question and several large housing schemes have been put forward and approved."

217. A good start has been made, and the new Mining Health Areas Regulations, 1935, are now in force. The mining areas will have to be resurveyed and " mining areas " demarcated before these new regulations are applicable to individual mines.

218. The Senior Health Officer, Mines Areas, dealing seriatim with methods of sanitation in the mines of the Western Province states :—

" (*a*) *Clearing of grass and bush.*—In the majority of mines this requirement is satisfactorily attended to.

" (*b*) *Drainage.*—Generally speaking was good in all but one mine.

" (*c*) *Combustible refuse disposal.*—Is carried out in a sanitary manner in all areas under review.

" (*d*) *Incombustible refuse disposal.*—Not generally satisfactory.

" (*e*) *Latrine accommodation*—

(*a*) *Surface.*— a definite improvement has been shown in the type latrine erected by most of the mines.

(*b*) *Underground.*—Leaves much to be desired.

" (*f*) *Night-soil disposal.*—Is efficiently carried out by incineration in two of the mines. In the other mines, where " fly-trapped " disposal pits are employed, few of these were free from fly-nuisance.

" (*g*) *Water supplies.*—In four of the mines, only, is pipe-borne water supplied to the African mine village.

" (*h*) *Bathing facilities.*—In only four of the mines are adequate shaft head bathing facilities provided for African labour

" (*i*) *Markets.*—Facilities are fairly adequate in most areas. Some are congested and need expansion. Prices are relatively high compared with other areas.

In nearly all areas the supply of meat is deficient both in quantity and quality.

" (*j*) *Slaughter-houses.*—Facilities are deficient in all areas.

> " (*k*) *Mosquito control.*—The problem of scrap machinery holding water has been stressed continually at every inspection, but still this dangerous source of mosquito breeding obtains at most of the mines. Much better organised mosquito-control is necessary throughout the area."

219. The diamond mines, four in number, have now combined to employ a medical officer between them. This medical officer is supplied by Government, and his salary is refunded by the companies in proportion to the labour force of the respective mines.

220. Employment on these surface mines is popular, and a good deal of improvement in environmental sanitation has been shown in the past year. With the exception of one all mines are engaged on housing schemes.

221. Companies working low-grade ground find financial difficulty in properly replacing discarded gravel back in the excavated areas. This defect will undoubtedly lead to malarial problems in the future over considerable tracts of country. No definite control is possible at present for no regulations covering this failure to replace " worked-out " gravel exist. The practice, it is believed, is considered to be " bad mining ", but, apparently, cannot be controlled legally.

## (VII) RURAL SANITATION.

222. The Senior Health Officer, Western Province, reports that :—

> " Village sanitation in practically every rural area in the Province is in the most appalling condition, and has to be seen to be believed. It is heart-breaking work against an impassable barrier of indifference and open hostility."

223. The Senior Health Officer, Ashanti, reports a serious fall in the standard of rural sanitation in Ashanti since 1928. For this he holds the financial depression of the last few years mainly responsible. There are no legal sanctions to insist on the elevation of the standard of rural sanitation to a reasonable and safe minimum. Education and moral suasion will take years to achieve tangible results. So many of the inhabitants of rural centres of any importance are " strangers," owing no allegiance to the local Chiefs, that co-operation is difficult to obtain.

224. It is believed that it is not possible with safety to adopt a principle of " pin-point " sanitation in the Colony, i.e., the sanitation of the larger centres alone and allowing the rural areas to fall back in sanitary standard to be improved sometime in the future through a long process of education and persuasion.

225. As in the past the larger centres will run the risk of repeated infection from surrounding rural areas with all the attendant curtailment of movement and stagnation of trade.

226. It is thought that there is a danger of too much " straining at the gnat " of exaggeration of the dangers of air transport in the transmission of disease while the " camel " of lack of sanitary control along the land trade routes is condoned.

227. Trade routes, along which are scattered large villages and small towns, with overgrown perimeters concealing numbers of water-retaining tins and bottles—all potentially capable of producing *Aedes aegypti*—constitute a menace of the first order.

228. The lack of proper latrine accommodation over large rural areas is a fertile source of disease both to man and cattle. The reaction of excreta-fouled surroundings has already been stressed in its particular application to the young.

229. A Public Health Ordinance, imposing a communal as well as a personal obligation, in conjunction with a Townships Ordinance, which are both at present under discussion, would do much to help.

## (VIII) FOOD IN RELATION TO HEALTH AND DISEASE.

230. A new market has been constructed at Agona Swedru comprising a protected meat stall and 80 covered stalls. Agona Swedru is a rapidly growing centre and it is hoped in the near future to add a further 60 stalls to the new market.

231. It has been stressed repeatedly that a well sited market can be a valuable source of revenue in addition to the health benefits derived from it.

The revenue from the Kumasi market in 1935 was £4,120, compared with £3,869 in 1934. Attention should always be paid to ensure that cloth and hardware sellers are not accommodated to the exclusion of the sellers of local foodstuffs, The primary object of any market is to provide a plentiful source of cheap foodstuffs sold under hygienic conditions.

### 2.—Slaughter-houses.

232. A new slaughter-house at Oda was nearing completion towards the end of 1935.

### 3.—Cattle Sheds.

233. None exist in the Gold Coast with the exception of those at the Veterinary Department Headquarters at Pong-Tamale.

### 4.—Dairies.

234. No true dairies exist, and relatively little fresh cows' milk is used. The sale of fresh milk is apparently on the increase in Accra and the Medical Officer of Health in his annual report mentions that its quality is giving rise to anxiety.

### 5.—Aerated Water Factories.

235. In the larger centres periodic inspections of all aerated water factories are carried out and their products subjected to bacteriological analysis.

### 6.—Restaurants and Eating Shops.

236. In every large centre these are subjected to frequent inspection and in Kumasi and elsewhere require to be licensed.

### 7.—Bakeries.

237. In the larger centres bakeries abound. In Accra there are already some one hundred. Bakeries in Kumasi, Accra and Sekondi are licensed.

### 8.—Food Inspection.

238. In all centres, where Health branch staff are stationed, foodstuffs are regularly inspected. Comparatively little had to be seized during the year. As a general rule traders voluntarily surrender unsound tinned foodstuffs for condemnation and destruction.

239. Wherever staff is available inspection of animals prior and after slaughter is carried out. When a Soyer stove is available even cysticercal meat, if not too extensively infested, is permitted to be sold after sterilisation.

### (*a*) Deficiency Diseases.

240. During 1935 no deaths were attributed to rickets, one to scurvy and none to beriberi.

241. Starvation accounted for 13 deaths as compared with 15 for 1934.

242. On the whole, although the African dietary cannot be considered well balanced, deficiency diseases do not figure largely in the list of fatal diseases. In the young child, however, the question is of great importance and the results of a defective dietary leave many children in a condition in which they are helpless to resist a simple, super-imposed bronchial or intestinal infection.

## (b) Measures taken to spread the knowledge of Hygiene and Sanitation.

### (I) TRAINING OF HEALTH PERSONNEL.

243. The school of sanitary inspectors in Accra, reopened in 1934, functioned throughout the year.

Several candidates appointed under the new regulations, requiring a higher, preliminary, educational standard, were admitted to the school during 1935.

244. The training of village overseers, as formerly, was carried out by the Senior Health Officer, Ashanti and Northern Territories, in Kumasi. The training of village overseers for the native authorities was commenced in Tamale during the year.

245. Year by year more reliance is being laid on the propaganda of health knowledge among the people, but apathy and hostility must still, as elsewhere, be met by prosecutions and fines.

246. Health visitors, as before, continue to be trained by the medical officers of health as well as by the medical officers in charge of welfare centres. The present cadre, the best obtainable at the time, is not adequate for the growingly important work and it is hoped to be able to put forward suggestions for 1937–38 for a properly educated grade of health visitors, each officer in which will be a trained nurse and midwife and will have undergone a comprehensive course in hygiene—both domestic and general.

247. The maternity hospital, Accra, continues to turn out midwives and subsidised midwives for the Health branch.

### (II) GENERAL HEALTH EDUCATION.

248. Close co-operation exists between the Education Department and the Medical Department in the teaching of hygiene in the schools. This subject forms part of the course in all schools and is duly stressed by the inspecting officers of the Education Department in their periodic visits of inspection.

The excellent *Teachers' Journal* forms a ready medium for furthering health knowledge among the teachers, and thanks are due to the Director of Education for the facilities offered for publishing articles on health topics.

249. The Junior Red Cross Links, which have now reached a total of 33, provide a most valuable means of instilling keenness and giving an outlet for the practical adaptation of what has been learned theoretically.

250. In most large centres " Health Days " have been held from time to time.

251. The educational work carried out at the welfare centres, where the prevention of malaria, intestinal disorders, worms, etc., are continually stressed and infant feeding, weaning, etc., explained, has been most valuable. This preventive education is carried out by medical officers, sisters, health visitors and voluntary workers into the homes of the people. The mass of disease is immense and treatment on a preventive basis still takes up much time, but pure prevention is looming larger year by year.

252. The medical officers of health and their staffs carry out much the same kind of propaganda in somewhat wider terms among the general population.

253. The public health museum started in Accra in 1934 grew steadily during the year. The Gold Coast Branch, British Red Cross Society and the Gold Coast League for Maternal and Child Welfare played a great and a growing part in the propagation of health knowledge. The work of the above League, which is a section of the Red Cross Society, in carrying out duties at the various weighing centres has been worthy of the highest praise.

254. The adumbrated formation of Township Boards would do much to bring home to the people at large the necessity for interesting themselves in communal health activities and problems, and increasing the sense of personal responsibility.

## IV.—PORT HEALTH WORK.

255. Quarantine measures were not imposed on any Gold Coast port during the period under review.

256. During the year, 3,249 deck and 314 third class passengers landed in Accra, giving a total of 3,563 as compared with a total of 2,467 for 1934. These passengers were appropriately dealt with on landing.

257. The Medical Officer of Health has expressed anxiety with reference to the rat vulnerability of the buildings constituting the port, and the arrival of direct sailings from Indian and Burmese ports of ships laden with rice and baled goods.

258. Takoradi (principal exports—cocoa, manganese, palm oil, gold, mahogany and fruit) :—

(*a*) During 1935 a total of 620 ships of a gross tonnage of 2,966,797 tons were dealt with. This total showed an increase of 15 per cent in the number of ships using the port during the year.

(*b*) Defects were noted in 156 ships. These defects usually consisted of a filthy condition of the crews' quarters and cooking accommodation. Foreign ships chiefly were involved.

(c) Sixty-four cases of malaria and two of pneumonia were removed to hospital from ships during the year. One ship brought fourteen cases of malaria and another ten cases.

(d) The water barge supplied 3,902,726 gallons of water to shipping during the year.

(e) Passenger traffic during the year included 2,711 deck passengers and 6,498 trans-immigrants, i.e. a total of 9,209 as compared with 9,993 in 1934. On landing these passengers were appropriately dealth with.

259. Of the rats caught in the port and town areas of both Takoradi and Accra none were found infected with P.pestis.

260. In these days, when consular visas and bills of health are considered superfluous, it is more and more necessary to render important ports unsuitable for the reception of infection from overseas. This in the older ports, such as Accra, is difficult and rat-proofing a problem of magnitude. Plague is a distinct threat and is immeasurably more difficult to control than smallpox and yellow fever.

## V.—MATERNITY AND CHILD WELFARE.

261. The welfare work in the Gold Coast continues on satisfactory lines, and, in spite of the mass of disease which calls for treatment, preventive methods are gradually taking their proper place.

262. Three distinct sources of activity are in operation. Firstly, Government has during 1935 been responsible for the welfare centres in Accra, Kumasi and Koforidua.

263. The result of the activities of these centres are as shown in the following table:—

TABLE XVII.

| Government. | Attendances. | | | |
|---|---|---|---|---|
| | Children. | | Expectant mothers. | |
| | 1934. | 1935. | 1934. | 1935. |
| Accra ... ... ... | 13,990 | 16,709 | — | 163 |
| Kumasi ... ... ... | 18,998 | 17,559 | 9,115 | 11,093 |
| Koforidua ... ... | 18,330 | 22,757 | 5,240 | 5,919 |
| | 51,318 | 57,025 | 14,355 | 17,175 |

264. In the Princess Marie Louise Welfare Centre in Accra 459 in-patients and in the Kumasi centre 749 in-patients were dealt with, compared with 501 and 638 respectively for 1934. The Koforidua centre is not equipped with cot accommodation.

In 1936 this centre will be taken over by the Red Cross Society.

265. The Cape Coast and Sekondi centres are controlled by the local Divisions of the Gold Coast Branch, British Red Cross Society.

266. The results of their activities during 1935 are as shown below.

TABLE XVIII.

| Red Cross. | Attendances. | | | |
|---|---|---|---|---|
| | Children. | | Expectant mothers. | |
| | 1934. | 1935. | 1934. | 1935. |
| Cape Coast ... ... ... | 11,196 | 10,593 | 4,115 | 3,893 |
| Sekondi and Shama ... | 9,132 | 9,039 | 3,325 | 3,463 |
| Total ... ... | 20,328 | 19,632 | 3,440 | 7,356 |

267. In addition to Government and Red Cross, activities were aided by the efforts of the Roman Catholic Mission at Djodzi, Eikwe and Kpandu, and by the Bremen Mission at Amedzope. The following total summarises the work done at these centres during 1935.

TABLE XIX.

| Mission. | ATTENDANCES. | | | |
|---|---|---|---|---|
| | Children | | Expectant mothers. | |
| | 1934. | 1935. | 1934. | 1935. |
| Djodzi (R.C.) ... ... | 6,560 | 1,903 | — | 90 |
| Eikwe ,, ... ... | 22,143 | 15,187 | — | 4,153 |
| Kpandu ,, ... ... | 20,710 | 14,930 | — | — |
| Amedzope (Bremen Mission) | — | 2,363 | — | — |
| Total ... ... | 49,413 | 34,383 | — | 4,243 |

268. The attendances at the baby weighing centres at Accra and Kumasi showed considerable increases over those for 1934. In Accra and Kumasi the figures for 1935 were 29,065 and 37,450 respectively, as compared with 24,555 and 19,702 for 1934. These centres are staffed partly by Government officers and partly by voluntary workers of the Gold Coast League for Maternal and Child Welfare. Weighing centre activities are confined to the larger towns, and very successful work was carried out at Bekwai in Ashanti, and at Savelugu in the Northern Territories, by European ladies working on a purely voluntary basis. Many thanks are due to these ladies for their hard and self-sacrificing work.

269. Nine nurse-midwives were employed by the Health branch during 1935, whose activities were reinforced by those of six subsidised midwives, who receive a subsidy of £3 *per mensem* to enable them to build up a satisfactory private practice

The results of the work done are tabulated below :—

TABLE XX.

| Station. | No. of midwives and subsidised midwives. | | No. of deliveries. | |
|---|---|---|---|---|
| | 1934. | 1935. | 1934. | 1935. |
| Accra ... ... ... | 6 | 9 | 507 | 585 |
| Bekwai ... ... ... | — | 1 | — | 29 |
| Cape Coast ... ... | 2 | 2 | 218 | 219 |
| Koforidua ... ... | 1 | 1 | 51 | 64 |
| Kumasi ... ... ... | 2 | 2 | 274 | 307 |
| Nsawam ... ... ... | — | 1 | — | 30 |
| Oda ... ... ... | — | 1 | — | 11 |
| Odumasi ... ... ... | — | 1 | — | 25 |
| Sekondi ... ... ... | 1 | 1 | 50 | 82 |
| Total ... ... | 12 | 19 | 1,100 | 1,352 |

270. The services of scientifically trained midwives are being more and more sought for as the general community are trained to experience their value.

271. (*a*) The well equipped and popular maternity hospital at Accra acts as the centre of the maternity activities in the Gold Coast. During the year an ante-natal block was opened—the gift of the Gold Coast Branch, British Red Cross Society. This provision allows for the admission of cases of diseases due to and complicating pregnancy and for the treatment and education of patients in ante-natal welfare. It also provides the necessary accommodation required for the instruction of the pupil-midwives in this important branch of midwifery. The new ante-natal block contains twelve beds.

(*b*) During 1935 some 662 deliveries were recorded resulting in the birth of 611 live babies. There were 31 maternal and 87 infant deaths. In 1934 the number of deliveries were 623. The total out-patient attendances during 1935 were 14,501 as compared with 13,907 in 1934. There were 129 cases of morbid puerperium compared with 123 in 1934.

(*c*) Twelve midwives, on the completion of their training, successfully passed the examination and obtained the Certificate of the Midwives Board.

(*d*) A hostel for the pupil-midwives has been built this year and will be opened shortly. It is hoped that this provision will attract a better type of pupil-midwife and give her better facilities for study and more comfortable living conditions. The pupil-midwives are given a maintenance allowance of £1 *per mensem* by Government. The number in training at the end of the year was 27. The provision of an assistant medical officer and a third nursing sister has enabled more time to be devoted to teaching the pupils, particularly in the practical side of normal midwifery and ante-natal care. The presence of the third nursing sister will, it is hoped, extend the possibility of the more efficient supervision of the district midwives. The newly appointed assistant medical officer will act as matron of the pupil-midwives hostel in which her residential quarters will be situated.

(*e*) The question of a new out-patient and dispensary block, and the provision of a private patient block, are matters for future consideration.

(*f*) The necessary better supervision of the district work in Accra is stressed in the annual report from the hospital. The district of Kawli Gono is allocated to the pupil-midwives where their work is regularly supervised.

In the other districts of Accra, supervision urgently requires extension.

### (*c*) *Recommendations for Future Work.*

272.

1. Water supply for Tarkwa, Salaga and Nsawam.
2. Improvement of the Ho water supply and its extension to the leper settlement.
3. Slum clearing and rehousing in Accra.
4. Public health legislation—townships and rural.
5. Provision of a contagious diseases hospital at Takoradi.
6. Partial conversion of pan-system of night-soil disposal in Accra and Kumasi into water-carriage systems.
7. The formation of a well-educated grade of health visitors.
8. An increase in the Health branch staff of an assistant director of health service, an additional medical officer of health and two additional sanitary superintendents.
9. The rehousing of the lepers at Accra and Sekondi.

W. M. HOWELLS,
*Acting Deputy Director,*
*Health Service.*

## VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINIC, ETC.

273. A list of hospitals, welfare centres and similar medical institutions is given in Appendix I and Return D contains a summary of all patients dealt with at these places. It is of interest to compare the figures for the past two years as shown in Table XXI.

TABLE XXI.

PATIENTS TREATED.

| Year. | Remaining in hospital. | Total cases treated. | Percentage increase on previous year. | Deaths. | Remaining in hospital. | Number of deaths per 1,000 of in-patients treated. |
|---|---|---|---|---|---|---|
| 1934 ... ... | 1,755 | 256,213 | 1·9 | 1,674 | 1,986 | 72·9 |
| 1935 ... ... | 1,986 | 273,476 | 6·7 | 1,841 | 2,165 | 72·5 |

274. It will be observed from the following table that a considerable increase took place in the number of African and European in-patients treated in the three larger stations in 1935 as compared with the previous year.

## TABLE XXII.

### AFRICANS AND EUROPEANS (IN-PATIENTS).

| STATION. | 1934. In-Patients treated. | | | 1935. In-Patients treated. | | |
|---|---|---|---|---|---|---|
| | Africans. | Europeans. | Persons. | Africans. | Europeans. | Persons. |
| Accra ... ... ... ... ... | 3,085 | 269 | 3,354 | 3,140 | 326 | 3,466 |
| Sekondi and Takoradi ... ... ... | 1,326 | 228 | 1,554 | 1,122 | 339 | 1,461 |
| Kumasi ... ... ... ... ... | 2,465 | 164 | 2,629 | 2,758 | 216 | 2,974 |
| Totals ... ... ... | 6,876 | 661 | 7,537 | 7,020 | 881 | 7,901 |

275. The average cost per patient per day (including diets, provisions, fuel and light, medical comforts and kitchen staff) showed a considerable reduction as may be seen by comparison with last year.

## TABLE XXIII.

### COST PER PATIENT.

| | 1934. | | 1935. | |
|---|---|---|---|---|
| | s. | d. | s. | d. |
| EUROPEAN HOSPITALS : (Accra, Axim, Cape Coast, Winneba, Kumasi, Takoradi and Tamale) | 3 | 6 | 3 | 0 |
| AFRICAN HOSPITALS : (Gold Coast Hospital Accra, Axim, Cape Coast, Koforidua, Kumasi, Saltpond, Sekondi, Tamale and Winneba) ... ... ... | 0 | 6½ | 0 | 6 |

276. After considerable delay owing to difficulties in connexion with the site, a start was made on the new hospital at Tarkwa towards the end of the year. The building, which should be completed about the middle of 1936, will consist of an administration block, a main block containing a male ward of 12 beds, a male ward for officials of four beds, a female ward of four beds, a maternity ward of two beds, and a separate building for the treatment of six male and four female patients suffering from tuberculosis.

277. When funds become available, this hospital will be provided with an X-ray plant.

278. The new hospital will prove particularly valuable in view of the considerable developments in the mining industry in the Tarkwa district and the number of cases of accident and tubercular disease which are met with.

### ACCRA.

279. The Gold Coast Hospital continued to live up to the high standard of medical practice which has been its hall-mark since it was first opened in 1923.

280. Apart from the valuable work carried on at this hospital, it serves as the training school for nurses and nurse-dispensers for the whole Colony.

281. It will be evident from the table given below that the work continues to grow. Great credit is due to all branches of the qualified and nursing staff of this institution.

282. It is anticipated that considerable improvements will be effected during 1936 to the out-patient department where the overcrowding has reached such a degree as to make work distinctly difficult.

## TABLE XXIV.

### WORK DONE AT GOLD COAST HOSPITAL.

| | 1934. | 1935. |
|---|---|---|
| Out-patients ... ... ... ... ... ... ... ... ... | 15,612 | 17,983 |
| In-patients ... ... ... ... ... ... ... ... ... | 3,085 | 3,140 |
| Major operations ... ... ... ... ... ... ... ... | 414 | 683 |
| Minor operations ... ... ... ... ... ... ... ... | 1,063 | 1,482 |
| Daily average of in-patients ... ... ... ... ... ... ... | 236 | 233 |

283. The X-ray Department at the Gold Coast Hospital was responsible for radiographing 1,658 cases during the year and some 401 patients attended on 9,428 occasions for various forms of electro-therapy and massage. The actual details can be seen in the next table.

## TABLE XXV.

| Radiography. | | Electro-therapy and massage. | |
|---|---|---|---|
| Barium | 111 | Diathermy | 1,167 |
| Chest | 245 | Faradism | 308 |
| Dental | 96 | Galvanism | 1,538 |
| Gall-bladder | 15 | Ionisation | 57 |
| General | 1,135 | Massage | 5,427 |
| Maternity | 32 | Radiant heat | 127 |
| Urinary tract | 24 | Ultra-violet ray | 768 |
| | | X-ray treatments | 36 |
| Total | 1,658 | Total | 9,428 |
| Of these 233 were Europeans<br>1,425 were Africans | | | |

284. The Venereal Diseases Clinic at the Gold Coast Hospital maintained its useful service and the new patients treated showed a considerable increase as far as concerns males but a diminution in the case of females.

Table XXVI gives further particulars.

## TABLE XXVI.

| | 1934. | 1935. |
|---|---|---|
| Total number of new cases (male) | 946 | 1,356 |
| Total number of new cases (female) | 359 | 242 |
| Total number of cases receiving treatment (male | 1,583 | 1,549 |
| Total number of cases receiving treatment (female) | 633 | 319 |
| Total number of new cases (male and female) | 1,305 | 1,598 |
| Total number of cases receiving treatment | 2,216 | 1,968 |

## KUMASI.

285. A further drop was recorded in 1935 of the attendances of out-patients at the Kumasi African Hospital. On the other hand, a large increase occurred in the number of in-patients—*see* Table XXVII.

286. As in previous years an appreciable portion of the patients treated and admitted to hospital were from the Northern Territories and French West African possessions. When funds become available consideration will have to be given to the construction of an entirely new African hospital at Kumasi.

## TABLE XXVII.

| | 1934. | 1935. |
|---|---|---|
| Out-patients | 13,088 | 12,660 |
| In-patients | 2,465 | 2,758 |
| Major operations | 153 | 141 |
| Minor operations | 576 | 509 |
| Daily average of in-patients | 134·5 | 140 |

## TAMALE.

287. In both in-patients and out-patients the numbers were more manageable during the year under review than in 1934. There were 1,344 in-patients and 19,755 out-patients as compared with 1,490 and 21,815 respectively for the previous year.

288. It is proposed to improve the accommodation for women during 1936 by the conversion of a large store into a female ward.

## PROPOSED NEW BUILDINGS.

289. It is proposed during 1936 to draw up plans for two much needed new hospitals with special accommodation for maternity cases and children, tubercular, enteric cases, etc., to replace the now out-of-date and inadequate buildings at Cape Coast and Sekondi.

## VILLAGE DISPENSARIES.

290. Perhaps the most important of the findings at the Conference of Senior Medical Officers of the British West African Colonies held in Accra in 1925 was to the effect that a school of medicine should be established in British West Africa at which Africans could receive a full course of training in medical subjects to enable them to practise medicine and surgery amongst their own people.

291. It will be recalled that in 1927 the Secretary of State for the Colonies appointed a committee to formulate a scheme for the establishment in British West Africa of such a college for the training of medical practitioners and the creation and training of an auxiliary service of medical assistants.

292. Early in 1928 this committee submitted a very comprehensive report setting out how effect could be given to such a scheme as was visualised by the Secretary of State.

293. The recommendations involved an expenditure of £73,000 on school buildings alone and a recurrent cost of nearly £100,000 when the full number of 250 medical assistants had completed their training.

294. Shortly after, however, the world economic depression began to affect the Colony and the scheme for a medical college in the Gold Coast had to be abandoned for the time being at any rate.

295. In November, 1929, a simplified scheme was evolved which aimed at the training within the succeeding fifteen years of eighty fully qualified dispensers capable of administering first-aid and of acting as assistant to the district medical officers.

296. The actual course was planned to last from three and a half to four years and the estimated recurrent cost by the fifteenth year was calculated at £24,372.

297. The capital expenditure on the scheme was estimated at £850 for a lecture room capable of holding forty pupils at a time. This scheme was approved by the Secretary of State in 1930 and became known as the Nurse-Dispenser Scheme.

298. It aimed at the provision of a cadre of African officers who had had training and experience in nursing and had also obtained their certificate of competency in dispensing.

299. A medical tutor was appointed in 1930 to operate the revised scheme but the appointment had to be abolished two years later during the general retrenchment of staff following the economic depression.

300. It was arranged that picked officers with this experience in nursing and dispensing should be posted to village dispensaries in areas devoid of medical services but situated within a reasonable distance of a hospital to ensure adequate supervision of the work by a qualified medical practitioner and to serve as a base hospital to which serious cases could be evacuated.

301. Originally, the embryo nurse-dispenser spent the first two years of his service working as a nurse-in-training in the wards of the Gold Coast Hospital, receiving a certain amount of tuition in pharmacy during his second year, and spending his third and fourth year in the dispensing school qualifying as a dispenser.

302. This system has been slightly modified in the past two years. After two years nursing, the future nurse-dispenser spends three years in dispensing.

303. If possible and after securing his druggists' certificate, a nurse-dispenser is given an opportunity of refreshing his memory on the nursing side of his subject by returning to the hospital wards to serve as a nurse for a time.

304. Up to the end of 1935 fourteen nurse-dispensers had completed their training and this number is available for work at approved village dispensaries.

305. Only six are actually engaged in village dispensary work on account of the fact that few native authorities have made any attempt to construct or otherwise provide suitable facilities and accommodation.

306. It should be explained that Government undertook to train skilled personnel and to supply drugs, dressings and other equipment on condition that the native authorities helped themselves by constructing the necessary buildings.

307. At the end of 1935, the distribution of dispensaries provided by native authorities was as follows :—(1) Tumu in the Lawra–Tumu district of the Northern Territories, (2) Walewale in the Mamprusi district of the Protectorate, (3) Bole in the Gonja district of the Protectorate, (4) Enchi in the Sefwi–Aowin district.

308. It is anticipated that accommodation will be available in 1936 at Anwiawso in the Sefwi–Aowin district, at Dabala in the Ada district, at Essiama in the Ahanta–Nzima district, at Wenchi in the Western Province of Ashanti, at Garu in the Mamprusi division of the Northern Territories, at Zubzugu in the Dagomba division of the Northern Territories and at Sandema in the Builsa division of the Northern Territories.

309. In the meantime, the nurse-dispensers who would normally be available for posting to dispensaries provided by the native authorities are employed in taking charge of Government hospitals and dispensaries as, for example, at Wiawso in the Sefwi-Aowin district, at Kete Krachi in the Northern Section of Togoland under British Mandate and at Salaga in the Northern Territories.

310. Provided that adequate supervision from a medical officer is available (and by adequate is meant a minimum of one visit by a medical officer per week), there can be no doubt whatsoever but that this system of nurse-dispensers in charge of outlying dispensaries serves a most useful purpose and must result in the alleviation of a considerable amount of suffering.

311. Aside from the Northern Territories where the Administration has successfully inspired the native authorities with a keen desire to secure the services of a nurse-dispenser, the native authorities have been definitely backward in providing suitable dispensaries.

312. During the year under review His Excellency ruled that native authorities should erect their own dispensaries according to plans approved by the Central Board of Health and that such authorities should be given facilities to obtain materials from the Public Works Department at landed cost in order to reduce the cost of construction of the buildings as much as possible—Customs duties being refunded to the native authority on presentation of a certificate from the Commissioner of the district that the materials had been used for the construction of the diepensary.

313. It is to be hoped that recent proposals for raising funds in the newly constituted Native Administration of Ashanti will make it possible for Ashanti to rival and even surpass the noteworthy achievements in connexion with the construction of village dispensaries that are already to the credit of the Northern Territories Protectorate.

314. As the Governor pointed out in his Address to Legislative Council 1935, " the improved financial outlook has justified a sufficient increase of staff in 1935–36 to enable the scheme for village dispensaries to be proceeded with. It is proposed to open six new dispensaries during the coming financial year, and the further development of the scheme will depend largely upon the speed with which suitable buildings can be built by the native authorities themselves."

## GOVERNMENT MEDICAL SCHOLARSHIPS.

315. Three African medical students were maintained in England during 1935.

In recent years the policy has been adopted of granting scholarships tenable at Achimota College in the first instance. This obviates funds being wasted on a student who after being sent to England with a medical scholarship, finds himself unable to assimilate what is, in fact, a difficult course of study.

## MISSION HOSPITALS AND DISPENSARIES.

### *Basel Mission.*

316. The Basel Mission was responsible for maintaining the only large mission hospital in the Colony.

The hospital at Agogo contains 56 beds and has a staff of one European doctor and other European and African nursing staff.

According to information received 70 European and 604 in-patients were admitted and 3,394 out-patients were attended during 1935.

### *Roman Catholic Mission.*

317. Reference is made on page 31 of this report to the welfare activities carried on by the Roman Catholic Mission during the year. A certain amount of first-aid and simpler medical work is also performed by the White Fathers at Jirapa and Navrongo in the Northern Territories.

## Report on the Work of the Dental Clinic.

318. The dental surgeon was on duty during the periods January to May 5th and 16th October to 31st December.

319. He was on leave of absence from 5th May to 16th October. In addition to the work carried out at Accra he visited Sekondi and Cape Coast.

320. Dental treatment was given to 281 European and 1,350 African officials making a total of 1,631, and also to 245 European and 354 African non-officials making 599 in this class and a grand total of 2,230.

321. The following table shows the number of dental operations which were performed :—

TABLE XXVIII.

| | Officials. | Non-officials. | Total. |
|---|---|---|---|
| (*a*) Extractions | 1,898 | 412 | 2,310 |
| Local anaesthesia | 1,875 | 393 | |
| General anaesthesia | 23 | 19 | |
| (*b*) Fillings : | | | |
| Gold | 5 | 3 | 8 |
| Amalgam | 124 | 95 | 219 |
| Porcelain | 84 | 53 | 137 |
| Cement | 105 | 84 | 189 |
| Temporary | 23 | 13 | 36 |
| (*c*) Dressings including root treatment | 284 | 200 | 484 |
| (*d*) Scalings | 198 | 145 | 343 |
| (*e*) Bridges, crowns, and other restorations | 4 | 5 | 9 |
| (*f*) Dentures | 44 | 31 | 75 |
| (*g*) Repairs to bridge, dentures and crowns | 72 | 39 | 111 |
| (*h*) Minor treatments | 39 | 32 | 71 |

322. The chief pathological conditions met with during the period were as follows :—

TABLE XXIX.

| Conditions. | |
|---|---|
| (1) Dental caries | 1,390 |
| (2) Alveolar abscess | 289 |
| (3) Pulpitis (acute and chronic) | 64 |
| (4) Periodontitis (acute and chronic) | 62 |
| (5) Excessive calcific deposit | 24 |
| (6) Cases diagnosed as true pyorrhoea alveolaris (chronic and sub-periodonitis) | 321 |
| (7) Gingivitis | 35 |
| (8) Septic roots | 175 |
| (9) Stomatitis | 15 |
| (10) Sepsis arising in connexion with eruption of permanent dentition | 42 |
| (11) Malposition of teeth | 15 |
| (12) Fracture of teeth | 12 |
| (13) Necrosis of teeth | 8 |
| (14) Neuralgia of non-dental origin | 1 |
| (15) Polypus of pulp | 3 |
| (16) Pulp stones | 2 |
| (17) Excessive post-extraction haemorrhage | 4 |
| (18) Supernumerary teeth | 36 |
| )19) Dental cyst | 2 |
| (20) Epulis | 3 |
| (21) Fibrous sarcoma of jaw | 3 |
| (22) Antrum disease | 1 |
| (23) Cancrum oris | 2 |
| (24) Fracture of jaw | 1 |
| (25) Chronic perforating hyperplasia of pulp | 1 |

W. H. DONALD,
*Dental Surgeon.*

## VII.—PRISONS AND ASYLUMS.

### (*a*) Prisons.

(*The information in this Report was kindly furnished by the Director of Prisons.*)

323. The Government prisons consist of four central prisons and twenty-one local prisons. The former are situated at Accra, Sekondi, Kumasi and Tamale and in these four prisons all prisoners sentenced to two years and over are confined.

324. The local prisons are situated at various district headquarters throughout the country and accommodate prisoners with shorter sentences. These prisons vary greatly in construction and capacity; certain of those along the coast are converted forts and, while they afford the maximum security, as a general rule, they lack ventilation and would accommodate more prisoners if satisfactory arrangement could be made. The more modern local prisons such as Akuse, Obuasi, Tarkwa and Winneba are of good design and in every way suitable for the purpose they serve.

325. At the other end of the scale are the bush prisons in remote districts in the Northern Territories. These are usually built of swish but every year improvements are being made with a view to converting them eventually into buildings of a permanent nature.

326. In all prisons prisoners sleep in association cells. In the central prisons the majority of the cells are small and accommodate three prisoners each. In the local prisons large association cells are the rule some of which accommodate ten to fifteen prisoners. At most prisons there are single cells where prisoners can be segregated for medical reasons or for the purpose of punishment.

327. All prisons are regularly visited by medical officers and there are infirmaries at the four central prisons under the immediate charge of a warder-dispenser.

At Elmina there are wards for the segregation of prisoners suffering from tuberculosis and leprosy.

328. Long-sentenced prisoners at the central prisons are mainly employed on various trades such as carpentry, masonry, tailoring, etc. Short-sentenced prisoners are employed as a rule on extramural work such as farming, station work and sanitation. The hours of labour are from 6 a.m.–11 a.m. and from 12.30 p.m.–3.30 p.m.

329. The daily average population was 1,906 as compared with 1,967 in 1934.

330. The daily average on the sick list was 42 or 2 per centum as compared with 61 and 3 per centum in 1934. The number of deaths was halved in 1935 being only 19. The death-rate is estimated at 10 per mille in the year under review as compared with 20 per mille in 1934.

331. The chief ailments were guinea-worm, malaria, gonorrhoea and various forms of ulcers. There were small epidemics of a mild form of chicken-pox but this disease was considerably less prevalent than in previous years.

332. The rations issued were according to scale with the exception of variations required in districts where the staple diet of the inhabitants differs. For instance, millet and guinea-corn take the place of maize in the Northern Territories and in certain districts of Ashanti coco-yam and plantains are substituted.

333. Prisoners are weighed monthly and they usually show an increase in weight and are discharged in a better physical condition than at the time of their admission. In addition, they have probably acquired some ideas of elementary hygiene and sanitation.

### (b) Asylum.

### COLONIAL ASYLUM, ACCRA.

334. The staff at the Colonial Asylum on the 31st of December, 1935, consisted of an alienist officer, a chief attendant, assistant chief attendant, matron, gate-keeper four female and twenty-one male mental nurses.

The number of inmates increased by 51 during the year as may be seen from the following table :—

TABLE XXX.

| | 1st January, 1935. | 31st December, 1935. |
|---|---|---|
| Male ... ... ... ... ... ... ... ... | 268 | 312 |
| Male criminal ... ... ... ... | 62 | 68 |
| Female ... ... ... ... ... ... ... ... | 62 | 63 |
| Female criminal ... ... ... ... ... ... | 1 | 1 |
| | Total 393 | 444 |

335. Seventeen patients were discharged, representing a ratio of a little over three per centum of the population. One patient escaped.

336. Seventy-four or nearly 14 per centum of the patients died.

337. The recovery rate was low when compared with modern mental hospitals, but it should undoubtedly improve when a new institution is built and accommodation allows of the separation of different grades of mental alienation. Under present conditions harmless and demented cases have to associate with violent and noisy patients.

338. The death-rate was regrettably high, although it must be admitted that many patients were in poor health on admission and certain were found to be suffering from trypanosomiasis and cerebral syphilis.

339. The number of cases of the first-mentioned disease showed a considerable increase during the year. Dysentery and tuberculosis appeared as in former years, but not in sufficiently large number to cause grave anxiety. Twenty-six cases of chicken-pox occurred and a number of patients suffered from a mild form of catarrhal jaundice, the cause of which remained obscure.

340. The additional accommodation added in 1934 has alleviated the serious overcrowding to some extent, but the number of admissions continued to increase and Government is now considering the building of adequate accommodation on a site about eight miles from Kumasi in Ashanti.

341. The diet remained excellent during the year, every effort is being made to meet individual likes and dislikes. Fresh vegetables were added to the dietary from the asylum garden in which a number of patients were employed.

342. Other forms of occupational therapy included assisting in the preparation and serving of food, the making of baskets and mats from the proceeds of the sale of which the inmates can buy small luxuries, helping with the hygienic arrangements of the buildings, and gardening.

343. The general sanitary condition of the asylum was well maintained during the year under circumstances which, to say the least of it, were decidedly difficult.

F. MACLAGAN,
*Alienist Officer.*

## VIII.—METEOROLOGY.

### (*a*) METEOROLOGY—AVERAGE FIGURES FOR THE YEAR 1935.

TABLE XXXI.

| | Temperature. | | | | | Rainfall. | | Wind. | |
|---|---|---|---|---|---|---|---|---|---|
| | Solar max. | Min. on grass. | Shade max. | Range. | Mean. | Amt. in inches. | Degree of humidity. | Gen. Direction. | Average force. |
| Accra ... | 140·8 | 71·2 | 84·2 | 11·3 | 79·9 | 2·36 | 79·2 | S.W. | 2·6 |
| Kumasi ... | 128·4 | 69·3 | 88·6 | 26·5 | 78·9 | 5·43 | 84·4 | W. | 1·6 |
| Sekondi ... | 143·5 | 72·7 | 89·8 | 22·9 | 82·0 | 3·80 | 72·5 | S.W. | 2 |
| Takoradi ... | 135·2 | 72·2 | 90·2 | 22·2 | 81·7 | 4·14 | 78·0 | S.W. | 1·8 |
| Tamale ... | 153·4 | 82·6 | 93·3 | 34·7 | 78·2 | 4·06 | 67·1 | S.W. | 1·7 |

### (*b*) METEOROLOGICAL OBSERVATIONS. LABORATORY GROUNDS, KAWLI BU, 9 A.M. READINGS, 1935.

TABLE XXXII.

| | Rain-fall in inches. | Highest maximum temperature recorded. | Lowest temperature recorded. | Daily average mean temperature. | Temperature of the dew point | |
|---|---|---|---|---|---|---|
| | | | | | Highest. | Lowest. |
| January ... | 0·16 | 89 | 70 | 82·6 | 75 | 49 |
| February ... | 0·22 | 86 | 76 | 42·5 | 79 | 70 |
| March ... | 2·95 | 89 | 72 | 82·5 | 78 | 71 |
| April ... ... | 1·81 | 88 | 76 | 82·6 | 77 | 73 |
| May ... ... | 6·12 | 87 | 74 | 79·6 | 76 | 71 |
| June ... | 12·64 | 84 | 72 | 79·1 | 76 | 71 |
| July ... ... | 2·74 | 83 | 75 | 78·2 | 75 | 71 |
| August ... | 0·76 | 80 | 71 | 76·1 | 74 | 69 |
| September ... | 2·51 | 81 | 73 | 76·7 | 74 | 70 |
| October ... | 0·68 | 85 | 72 | 79·2 | 75 | 67 |
| November ... | 1·082 | 87 | 73 | 81·3 | 75 | 72 |
| December ... | 0·74 | 87 | 73 | 80·8 | 76 | 66 |

Total Rainfall 32·412 inches.

# IX.—SCIENTIFIC.

## (a) Annual Report of the Laboratory Service.

This report refers to the work done in the Accra laboratory during the period 1st January to 31st December, 1935.

### REPORT ON ROUTINE WORK.

344. *Yaws and Syphilis.*—Three thousand, six hundred and fifty-five Wassermann tests were carried out, 44% were positive. These results correspond closely with those of the last five years.

345. *Infections due to organisms of the Salmonella group.*—The following table shows the number of infections in this group based on cultivation, agglutination and post-mortem findings.

TABLE XXXIII.

| | Culture. | | | Agglutination. | P.M. | Total. |
|---|---|---|---|---|---|---|
| | Blood. | Fæces. | Urine. | | | |
| S. typhi... ... ... ... | 12 | — | — | 32 | 2 | 46 |
| S. paratyphi A... ... ... | 3 | — | — | 6 | — | 9 |
| S. paratyphi C (Hirschfeld) ... | — | — | — | — | 2 | 2 |
| S. paratyphi B... ... ... | — | — | — | 3 | — | 3 |
| S. american suipestifer ... | 1 | — | — | — | — | 1 |
| S. reading ... ... ... | — | 2 | — | — | — | 2 |
| S. ærtrycke ... ... ... | — | — | — | 1 | — | 1 |
| S. enteritidis ... ... ... | — | — | — | 1 | — | 1 |
| Total ... ... | — | — | — | — | — | 65 |

346. *S. paratyphi C.*—The majority of infections with this organism occur, in the Gold Coast, in infants under 3 years of age. Death usually occurs in three to six days from septicaemia. Severe jaundice is practically always a feature.

347. *S. american suipestifer.*—This organism was recovered together with Staph. aureus from the blood of an African woman aged 19 years who was confined in the Maternity Hospital, Accra. The labour was normal, but five days after delivery the temperature rose to 103° F. There were no symptoms of intra-uterine infection. Blood culture yielded a growth of Staph. aureus and an organism of the Salmonella group which was found to be the American suipestifer type. The faeces, urine, and an intra-uterine swab were negative. The temperature returned to normal after five days and the patient was discharged five days later. She was quite well when seen three weeks later. No source of infection could be discovered.

348. *S. reading.*—This organism was isolated from the faeces of a European suffering from acute gastro-enteritis following the eating of a salad containing duck eggs. None of the salad could be obtained for examination.

The same organism was isolated from the faeces of a garden boy working in the compound, but he stated that he had eaten some of the same salad which his master had left over and had suffered from mild diarrhœa as a result.

349. *Dysentery.*—*(a) Protozoal.* 4,652 stools were examined microscopically. E. histolytica was found 41 times. Balantidium coli was found four times, and Lamblia intestinalis three times.

*(b) Bacillary.*—225 stools were examined bacteriologically with the following results:—

TABLE XXXIV.

| Organism. | Number of times isolated. |
|---|---|
| Bact. flexneri ... ... ... ... ... | 14 |
| Bact. shiga ... ... ... ... ... | 1 |
| Schmitz's bacillus ... ... ... ... | 2 |
| Sonne's bacillus... ... ... ... ... | 4 |

350. Strictly speaking, the infections due to Sonne's bacillus were of the food poisoning type and were not dysenteries. The epidemic involved fifty-two students and adults at Achimota College, one case proved fatal and the post-mortem findings are given below.

351. Vomiting, diarrhœa and headache, accompanied by a sharp rise in temperature to 103° F.–105° F. commenced 12–24 hours after a meal consisting of rice, tinned corned beef, and fresh calves' liver. Sonne's bacillus was isolated from the stools of the first four cases, seen about three hours after the commencement of the attack. The stools of these four cases and those of the remainder of the victims were examined bacteriologically five days later with negative results. The temperature dropped to normal in 24 to 48 hours and most of the victims were quite fit in four days. Unfortunately none of the food was available for examination. The stools and blood of the whole kitchen staff and of those who handled the food were examined. Sonne's bacillus was not isolated from any of the stools and only one serum showed any agglutins for that organism. This serum agglutinated the Oxford standard suspension Sonne's bacillus in a dilution of 1/16. It was a cook who had felt off " colour " four days previously. Repeated examination of her stools was negative for Sonne's bacillus.

352. *Post-mortem findings in the fatal case.*—The body was that of a well-nourished African female child aged 7 years. The liver was pale in colour, of normal size and the cut surface had a patchy appearance caused by alternate dark yellow and light yellow areas. It was greasy. The kidneys and spleen were congested. The mucous membrane of the stomach was very congested and there was a small amount of thick green mucus present.

Marked congestion and petechial hæmorrhages were present in the small intestine especially near the caecum. Higher up in the intestine the mucous membrane was roughened and had a flannel appearance ; there were small petechial hæmorrhages. The lymphoid tissue was hyperæmic. There was a large amount of green mucoid material present.

The mucous membrane of the large intestine was slightly congested. The lungs were slightly congested and the heart showed a few petechiae beneath the pericardium.

Sonne's bacillus was isolated from the contents of the small intestine. Microscopical examination of the liver revealed congestion and slight cloudy swelling.

353. *Blood Cultures* :—

TABLE XXXV.

| *Organism.* | *Number of times isolated.* |
|---|---|
| Bact. coli | 2 |
| Bact. friedlander (with Staph. aureus) | 1 |
| Brucella melitensis | 1 |
| Pneumococcus | 4 |
| Salmonella typhi | 12 |
| ,, paratyphi A | 3 |
| ,, american suipestifer (with Staph. aureus) | 1 |
| Staph. aureus | 5 |
| Strep. hæmolyticus | 5 |
| Positive cultures | 34 |
| Negative cultures | 79 |
| Total cultures | 113 |

354. *Human brucellosis.*—Although cases of fever running an undulant course with headache, joint pains, etc., have been met with in British West Africa and have been very suggestive of infection with organisms of the Brucella group, it was not until this year that an organism of this group was isolated from man. A detailed account of the case is given below, together with temperature chart.

355. Alima Kra, an African male aged about 36 years, was admitted to the Gold Coast Hospital, Accra, on 16th February, 1935 with a temperature of 100° F. and a pulse of 96. He was suffering from loss of speech and severe pains in the joints. The knee and ankle jerks were increased. There was an extensor plantar response on the left side. The abdominal reflexes were absent except in the right upper quadrant. Muscle power and tone were generally weaker on the right

side. There was no malarial parasites in the peripheral blood and the Wassermann test was negative. Blood culture was made on 28th February, 1935 and after five days incubation at 37° C yielded a growth of a minute gram negative non-motile bacillus which was later identified as Br. melitensis. The patient's serum agglutinated the Oxford standard suspension of Br. melitensis in a dilution of 1/640.

The temperature returned to normal on 23rd March, 1935 and, except for an occasional rise to 99° F., remained normal. The patient was discharged on 25th May, 1935. The speech gradually returned about the middle of April and he then gave the following history. He was a wood carrier and came to the Gold Coast from French Haute Volta a year previously. In his own country he drank considerable quantities of goat's and cow's milk. Since his arrival in the Gold Coast he had only consumed cow's milk. His illness started two months before he came to hospital with fever and pains in the joints. He gradually got worse and his sight became affected and finally he lost the power of speech ten days before admission to hospital.

356. I am very much indebted to Professor G. C. Wilson of the London School of Hygiene and Tropical Medicine for the trouble he took in the identification of the organism. His report follows :—

" 1. Grows equally well in air and 10 per cent CO2.
2. Does not form $H_2S$ beyond first 24 hours.
3. Grows in the presence of thionin 1/60,000 and 1/30,000 and basic fuchsin 1/50,000 and 1/25,000, but not in the presence of methyl violet 1/100,000 and 1/50,000 or pyronin 1/200,000 and 1/100,000.
4. Is agglutinated by a monospecific melitensis but not by a monospecific abortus serum.
5. Is pathogenic to guinea-pigs, giving rise to lesions similar to those produced both by Br. abortus and Br. melitensis.

" I have no doubt that the strain is of the melitensis type. The fact that it does not grow in the presence of methyl. violet or pyronin is not unusual, since one or other, or both, of these dyes often prove inhibitory to melitensis strains."

The case is of considerable interest as it is the first proved case of Brucella fever met with in the Gold Coast and probably in British West Africa. *See* Temperature Chart.

357. *Histological.*—Six hundred and ninety-six tissues from 309 humans and 86 animals were sectioned. The following tumours were met with :—

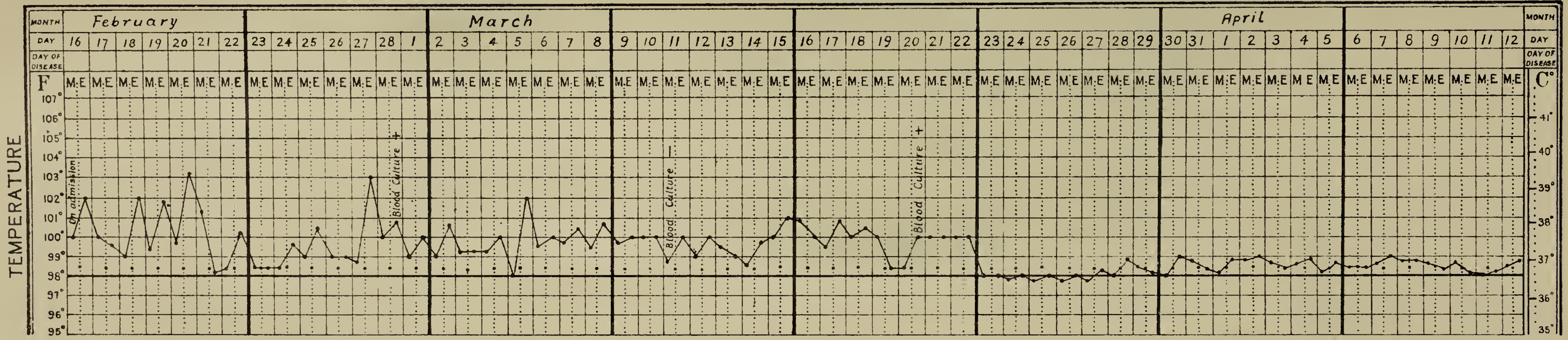
## TABLE XXXVI.

| | |
|---|---|
| (*a*) *Malignant* 10·3 per cent of human cases. | |
| Carcinoma | 18 |
| Sarcoma | 10 |
| Melanoma | 3 |
| Endothelioma | 1 |
| (*b*) *Innocent.* | |
| Fibroma | 7 |
| Fibromyoma | 4 |
| Lipoma | 4 |
| Ovarian cyst | 2 |
| Epulis | 1 |
| Ganglion | 1 |
| Giant-celled tumour | 1 |
| Odontome | 1 |
| Myeloma | 1 |
| Keloid | 1 |
| Nævus | 2 |
| Graves disease | 1 |
| Cystadenoma thyroid | 1 |
| Polypi(nasal) | 2 |

358. Of the malignant tumours over half were carcinomata. Four of the cervix uteri, four arising in chronic ulcers, two breast, two salivary gland, one urinary bladder, one stomach, one secondary in a lymph node with unknown primary, one ganglioneuroma of the mouth in a child, and one about which there is a doubt. This last case was a man with a large tumour on the back of the head

## TEMPERATURE CHART — GOLD COAST COLONY.

Patient's Name *Alima Kra* Ward. *G.*



eroding a four inch disc out of the skull. Biopsy showed a columnar or transitional cell type of growth. At autopsy the liver contained much growth. No primary focus was found in the genito-urinary tract and it was therefore presumed that the growth was primary in a skin appendage of the scalp. Of the three melanomata one was of the carcinomatous type from the eye, one from the foot and one from the inguinal glands.

In the innocent tumours is included a giant-celled tumour of the ulna. This is described in some text-books as a sarcoma, but appears to be non-malignant.

359. *Rabies.*—The brains of three humans and 75 dogs were examined for Negri bodies. They were present in the three human brains and in 32 of the dog brains. The human cases were children from 6 to 12 years old. The incubation period varied from 38 to 89 days.

360. *Typing of pneumococci.*—Culture media were sent to the various mines with the idea of isolating strains of pneumococci for typing, but the results have not been satisfactory. In the first place very few cultures have been received and secondly contaminations among those received were frequent.

Pneumococci from cases of lobar pneumonia in the Gold Coast Hospital and from a few cases in the mines invariably fell into group IV which contains many different types. No Type I, II or III was found except in three cases of pneumococcal infection other than pneumonia, i.e. peritonitis and meningitis. The infecting organism in each case being Type I.

361. *Sickle-cell anæmia.*—In seven post-mortems, spleens which agree histologically with descriptions by Yater and Molari *were found. Six of the spleens were enlarged and soft, one was shrunken and fibrosed.

The causes of death were not determined definitely except in the case of one child who had a Paratyphosus C infection.

Several of the cases died unexpectedly during pregnancy, and it is thought that the sickle cell trait may be a contributory cause of maternal mortality.

362. *Diphtheria.*—Five cases of diphtheria were seen during the year and virulent strains of C. diphtheriæ were isolated from them. One case occurred in Kumasi and was an adult European. The remaining four cases occurred in Accra and were African children from 1 to 10 years of age. One was fatal. It was noticeable that the contacts, although crowded in small houses, did not contract the disease. So far, the strains examined have turned out to be either the " mitis " of " intermediate " type, no " gravis " strains have been met with.

363. *Schick Tests.*—It was hoped to Schick test a large number of school children and infants during the year but this work was interrupted by shortage of staff due to leave and illness. However, a small number were done and the results are given below.

TABLE XXXVII.

AFRICANS.

| Age. | No. of Tests. | Males. | % pos. | Females. | % pos. | Total % pos. |
|---|---|---|---|---|---|---|
| 1–12 months ... ... | 19 | 11 | 27·2% | 8 | 25% | 26·3% |
| 1–10 years ... ... | 9 | 7 | 14·2% | 2 | — | 11·1% |
| 10–15 years ... ... | 94 | 57 | 17·5% | 37 | 16·2% | 17% |
| 15–20 years ... ... | 138 | 110 | 3·6% | 28 | 21·4% | 7·2% |
| Total ... ... | 260 | 185 | 9·7% | 75 | 18·6% | 12·3% |

364. *Mulattos.*—Eighteen tests were performed on mulattos varying in age from 5 to 20 years (seven males and eleven females), 44·4 per cent were positive.

365. I am very grateful to Dr. R. A. O'Brien, Director of the Wellcome Physiological Research Laboratories, for testing the Schick toxin used.

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**Jour. Amer. Med. Assoc.* 1931 Vol. 96 No. 20 p. 1671.

## TABLE XXXVIII.
## BACTERIOLOGICAL EXAMINATIONS OF WATER SUPPLIES.

| Source. | Negative. | *B. coli present ; specimens enumerated according to smallest volume (c.c.s.) in which B. coli found.* | | | | | *Totals.* |
|---|---|---|---|---|---|---|---|
| | | 100 | 10 | 1 | 0.1 | 0.01 | |
| ACCRA. | | | | | | | |
| No. 1 Final Filter ... ... | 12 | — | — | — | — | — | 12 |
| No. 2 ,, ,, ... ... | 12 | 1 | — | — | — | — | 13 |
| No. 3 ,, ,, ... ... | 14 | — | — | — | — | — | 14 |
| No. 4 ,, ,, ... ... | 10 | 1 | 1 | — | — | — | 12 |
| No. 5 ,, ,, ... ... | 11 | — | 1 | — | — | — | 12 |
| No. 6 ,, ,, ... ... | 12 | — | — | — | — | — | 12 |
| No. 1 Storage Reservoir ... | 5 | 6 | 2 | — | — | — | 13 |
| No. 2 ,, ,, ... | 5 | 1 | 3 | — | — | — | 9 |
| No. 1 Prefilter ... ... | 1 | — | — | — | — | — | 1 |
| No. 3 ,, ... ... | 1 | 1 | — | — | — | — | 2 |
| No. 4 ,, ... ... | 3 | — | — | — | — | — | 3 |
| No. 2 Low Level ... ... | 1 | — | — | — | — | — | 1 |
| Laboratory Tap ... ... | 51 | 1 | — | — | — | — | 52 |
| Nsawam Road Standpipe ... | 4 | — | — | — | — | — | 4 |
| Anugi Avenue Standpipe ... | 1 | — | — | — | — | — | 1 |
| Soda Waters ... ... ... | 166 | — | 2 | — | — | — | 168 |
| OUTSTATIONS. | | | | | | | |
| Bibiani ... ... ... ... | — | 1 | — | — | — | — | 1 |
| Obuasi ... ... ... ... | — | — | 3 | 1 | — | — | 4 |
| Konongo ... ... ... | 1 | — | — | — | — | — | 1 |
| Bogosu ... ... ... ... | — | — | — | 1 | — | — | 1 |
| Apatasu ... ... ... | — | — | — | 1 | — | — | 1 |
| Kumasi ... ... ... | 4 | — | — | — | — | — | 4 |
| Koforidua (Rain-water Tank) | 1 | — | — | — | — | — | 1 |
| Totals ... ... ... | 315 | 12 | 12 | 3 | — | — | 342 |

## TABLE XXXIX.
## STATISTICAL RETURN FROM THE ROUTINE DIVISIONS INCLUSIVE OF REPEAT EXAMINATIONS.

| | |
|---|---|
| Examinations of blood :— | |
| (*a*) For parasites, total ... | 7,227 |
| 1. Malaria ... | 1,594 |
| 2. Trypanosomes ... | 32 |
| 3. Microfilaria ... | 44 |
| (*b*) Differential and complete counts ... | 515 |
| (*c*) Agglutinations ... | 231 |
| (*d*) Blood cultures ... | 113 |
| (*e*) Wassermann tests ... | 3,655 |
| (*f*) Chemical examinations, total ... | 157 |
| 1. Urea ... | 79 |
| 2. Sugar... | 70 |
| 3. Van den Bergh ... | 18 |
| (*g*) Blood grouping ... | 71 |
| Examinations of fæces, total ... | 4,652 |
| (*a*) General examinations ... | 4,652 |
| (*b*) Bacteriological ... | 225 |
| Examinations of urine, total ... | 3,469 |
| (*a*) General ... | 3,041 |
| (*b*) Bilharzial infections ... | 191 |
| (*c*) Bacteriological ... | 237 |
| Examinations of sputa ... | 1,104 |
| Miscellaneous examinations including pus ... | 786 |
| Cerebro-spinal fluids ... | 76 |
| Post-mortem examinations ... | 143 |
| Bacteriological examinations of drinking waters ... | 342 |
| Animal examinations and inoculations ... | 65 |
| Rat examinations ... | 2,991 |
| Venereal disease smears, total ... | 2,140 |

## TABLE XL.

## POST-MORTEM EXAMINATIONS.

*Infectious and Parasitic Diseases.*

| | |
|---|---|
| Typhoid fever | 4 |
| Paratyphoid fever (S. paratyphi C) | 2 |
| Meningitis (pneumococcal) | 1 |
| Pulmonary tuberculosis | 3 |
| Generalised tuberculosis | 3 |
| Septicæmia (streptococcal) | 4 |
| Septicæmia (staphylococcal) | 1 |
| Tetanus | 3 |
| Trypanosomiasis | 6 |
| Malaria (cerebral) | 4 |
| Rabies | 2 |
| Influenza | 1 |
| Gas gangrene | 1 |

*Cancer and other Tumours.*

| | |
|---|---|
| Von Recklinghausen's disease | 1 |
| Primary carcinoma of scalp | 1 |
| Primary carcinoma of liver | 1 |
| Carcinoma of bladder | 1 |

*Diseases of Circulatory System.*

| | |
|---|---|
| Myocardial degeneration | 2 |
| Aortitis (syphilitic) | 2 |
| Atheroma of aorta and coronary obstruction | 3 |
| Aneurysm of aorta | 3 |
| Rupture of heart | 1 |
| Angina pectoris | 1 |
| Pulmonary embolism | 2 |
| Myocarditis (tubercular) | 1 |
| Myocarditis (infective) | 1 |

*Diseases of Respiratory System.*

| | |
|---|---|
| Lobar pneumonia | 6 |
| Broncho-pneumonia | 8 |

*Diseases of Digestive System.*

| | |
|---|---|
| Peritonitis | 3 |
| Acute bacillary dysentery | 1 |
| Amœbic dysentery | 3 |
| Food poisoning (Sonne's bacillus) | 1 |
| Suppurative cholangitis | 1 |
| Acute dilatation of stomach | 1 |
| Enteritis | 1 |
| Chloroform poisoning (delayed) | 2 |

*Diseases of the Genito-urinary System.*

| | |
|---|---|
| Uræmia | 1 |
| Arteriosclerotic kidney | 1 |
| Malarial nephritis | 1 |
| Chronic nephritis | 2 |

*Diseases of Pregnancy.*

| | |
|---|---|
| Eclampsia | 1 |
| Pregnancy and sickle-cell trait | 1 |
| Ante-partum hæmorrhage (placenta prævia) | 1 |

*Diseases of early Infancy.*

| | |
|---|---|
| Hydrocephalus | 1 |
| Icterus neonatorum | 1 |
| Umbilical sepsis | 1 |
| Still birth | 2 |
| Birth injuries | 2 |

TABLE XL—*contd.*

| | |
|---|---|
| *Death from Violence.* | |
| Drowning | 5 |
| Multiple injuries | 8 |
| Ruptured kidney | 1 |
| Cerebral hæmorrhage | 6 |
| Fracture of cervical vertebræ | 2 |
| Suicidal hanging | 6 |
| Fracture skull | 4 |
| Stab wounds | 2 |
| Gun-shot wounds | 3 |
| Amputation of penis | 1 |
| Burns | 2 |
| Asphyxia (œdema glottidis) | 1 |
| *Ill-defined Diseases.* | |
| General debility | 2 |
| Status lymphaticus | 1 |
| Rupture splenic artery | 1 |
| Toxæmia | 2 |

G. ROBINSON,
*Senior Pathologist.*

### (b) Annual Report of the Analytical Chemist.

366. The total number of samples examined in the Chemical Laboratory, Accra, during 1935 amounted to 2,369. Particulars are given in the following table :—

TABLE XLI.

| | |
|---|---|
| I.—*For Coroners and Medical Officers.* | |
| Viscera | 49 |
| Medicines | 13 |
| | 62 |
| II.—*For the Customs Department.* | |
| Beer and stout | 61 |
| Brandy | 12 |
| Geneva | 12 |
| Gin | 3 |
| Liqueur | 2 |
| Medicines (patent and others) | 85 |
| Methylated spirit | 60 |
| Milk | 43 |
| Miscellaneous | 90 |
| Paint, etc., | 19 |
| Perfumery | 78 |
| Port | 15 |
| Rum | 10 |
| Sherry | 25 |
| Tonic and medicated wine | 88 |
| Vermouth | 66 |
| Whisky | 23 |
| Wine (other kinds) | 610 |
| | 1,302 |
| III.—*For Medical Department.* | |
| Drinking water | 41 |
| Miscellaneous | 15 |
| | 56 |

TABLE XLI—*contd.*

IV.—*For Police Department.*

| | |
|---|---|
| Illicit spirit ... ... ... ... ... ... ... ... | 853 |
| Miscellaneous ... ... ... ... ... ... ... ... | 16 |
| Native medicines, etc. ... ... ... ... ... ... | 64 |
| | 933 |

V.—*For other Department.*

| | |
|---|---|
| Miscellaneous ... ... ... ... ... ... ... | 16 |
| Total ... ... ... ... ... | 2,369 |

367. The above total represents an increase of 601 samples or 34 per centum over the corresponding figure for last year.

368. The increase is distributed among every department except the Medica Department, and is most marked in respect of samples of illicit spirits.

369. The increase in the work of the Customs Department was due to the number of samples of ordinary wine sent for analysis—as distinct from tonic and medicated wine and vermouth.

370. Bismuth was found at the site of injection and also in the liver in connexion with the deaths of two children.

R. W. CLARKE,
*Analytical Chemist.*

P. S. SELWYN-CLARKE,
*Acting Director of Medical Services.*

# RETURNS.

# RETURN A.

## MEDICAL, HEALTH AND LABORATORY SERVICE STAFF ON THE 1ST JANUARY, 1935.

| | Authorised establishment. | Provision in estimates.† | Vacancy. |
|---|---|---|---|
| Director of Medical Services | 1 | 1 | — |
| Deputy Director of Medical Service | 1 | 1 | — |
| Deputy Director of Health Service | 1 | 1 | — |
| Deputy Director of Laboratory Service | — | — | — |
| Assistant Director of Medical Service | 2 | 1 | — |
| Assistant Director of Health Service | — | — | — |
| Specialists (one surgical and one medical) | 2 | 2 | — |
| Senior Health Officers | 2 | 3 | — |
| Senior Medical Officers | 6 | 6 | — |
| Senior Pathologist | 1 | 1 | — |
| Pathologists | 2 | 2 | — |
| Medical Officers | 37 | 37 | — |
| Medical Officers of Health | 8 | 8 | — |
| Alienist Officer | 1 | 1 | — |
| Woman Medical Officer | 1 | 1 | — |
| Women Medical Officers (Welfare Centres) | 4 | 3 | — |
| African Medical Officers | 5 | 5 | — |
| Radiographer | 1 | 1 | — |
| Assistant Radiographer | 1 | 1 | — |
| Dental Surgeon | 1 | 1 | — |
| African Government Dentist | 1 | — | — |
| Analytical Chemist | 2 | 2 | — |
| Dispensers' Instructor | 1 | 1 | — |
| Medical Storekeeper | 1 | 1 | — |
| Secretary, Gold Coast Hospital | 1 | 1 | — |
| Chief Sanitary Superintendent | 1 | 1 | — |
| Sanitary Superintendents | 19 | 19 | — |
| Laboratory Assistants | 2 | 2 | — |
| EUROPEAN NURSING STAFF. | | | |
| Matron | 1 | 1 | — |
| Senior Nursing Sister | 3 | 3 | — |
| Nursing Sisters | 27 | 27 | — |
| MEMBERS OF THE SUBORDINATE STAFF. | | | |
| *Medical Branch.* | | | |
| Chief Dispensers | 2 | 2 | — |
| First Division Dispensers | 6 | 6 | — |
| Second Division Dispensers and Dispensers-in-Training | 91 | 91 | — |
| Laboratory Attendants | 2 | 2 | — |
| Chief Nurses | — | — | — |
| First Division Nurses | 6 | 6 | — |
| Second Division Nurses and Nurses-in-Training | 198 | 198 | — |
| Midwives | 3 | 3 | — |
| Midwives-in-Training | 6 | 6 | — |
| Office Assistant and Accountant | 1 | 1 | — |
| First Division Clerks | 2 | 2 | — |
| Second Division Clerks | 24 | 24 | — |
| Lodge-Keepers | 2 | 2 | — |
| Telephone Operators | 4 | 4 | — |
| *Lunatic Asylum.* | | | |
| Head Attendant | 1 | 1 | — |
| Assistant Attendant | 1 | 1 | — |
| Mental Nurses | 24 | 24 | — |
| Matron | 1 | 1 | — |
| Gatekeeper | 1 | 1 | — |
| *Health Branch.* | | | |
| Chief Clerk | 1 | 1 | — |
| First Division Clerk | 1 | 1 | — |
| Second Division Clerks | 18 | 18 | — |
| Sanitary Inspector and Training Officer | 1 | 1 | — |
| Senior Division Sanitary Inspectors | 2 | 2 | — |
| First Division Sanitary Inspectors | 5 | 5 | — |
| Second Division Sanitary Inspectors and Sanitary Inspectors-in-Training | 97 | 105 | — |
| Storekeepers | 2 | 2 | — |
| Disinfector Mechanic | 1 | 1 | — |
| Vaccinators | 12 | 12 | — |
| Senior Village Overseer | 1 | 1 | — |
| Village Overseers | 18 | 18 | — |
| Assistant Disinfector Mechanics | 4 | 4 | — |
| Nurse-Midwives | 9 | 9 | — |

## RETURN A—*contd.*

| | Authorised establishment. | Provision in estimates. | Vacancy. |
|---|---|---|---|
| *Health Branch—contd.* | | | |
| Second Division Dispensers | 4 | 4 | — |
| Second Division Nurses and Nurses-in-Training | 13 | 13 | — |
| Health Visitors | 4 | 4 | — |
| Engineering Fitter | 1 | 1 | — |
| Market Clerks | 4 | 5 | — |
| *Contagious Diseases Hospital.* | | | |
| Caretaker | 1 | 1 | — |
| Attendants | 3 | 3 | — |
| *Medical Research Institute.* | | | |
| Laboratory Attendants | 10 | 10 | — |
| Second Division Clerks | 1 | 1 | — |

## RETURN B.

## FINANCE.

*Estimated Expenditure for the year* 1935.

### (*a*) Personal Emoluments.

| *Medical.* | £ | *s.* | *d.* |
|---|---|---|---|
| Administrative officers | 4,300 | 0 | 0 |
| Specialists | 2,775 | 0 | 0 |
| Senior medical officers | 6,749 | 0 | 0 |
| Medical officers (European and Africans) | 37,485 | 0 | 0 |
| Dental surgeon | 960 | 0 | 0 |
| European nursing staff | 13,348 | 0 | 0 |
| African nursing staff and dispensers | 33,157 | 0 | 0 |
| Clerical staff | 4,323 | 0 | 0 |
| Various items, allowances, etc. | 13,824 | 0 | 0 |
| Estimated total personal emoluments | 116,921 | 0 | 0 |
| Actual total personal emoluments | 112,753 | 9 | 7 |
| *Health.* | | | |
| Administrative officers | 1,400 | 0 | 0 |
| Senior health officers and medical officers of health | 11,107 | 0 | 0 |
| European sanitary inspectors | 9,529 | 0 | 0 |
| African sanitary inspectors | 12,709 | 0 | 0 |
| Various items, allowances, etc. | 18,308 | 0 | 0 |
| Estimated total personal emoluments | 53,053 | 0 | 0 |
| Actual total personal emoluments | 49,836 | 0 | 4 |
| *Laboratory Service.* | | | |
| European staff | 4,793 | 0 | 0 |
| African staff | 1,346 | 0 | 0 |
| Estimated total personal emoluments | 6,138 | 0 | 0 |
| Actual total personal emoluments | 6,045 | 16 | 0 |

### (*b*) Other Charges.

| *Medical.* | £ | *s.* | *d.* |
|---|---|---|---|
| Passages, transport, etc. | 11,516 | 0 | 0 |
| Hospital equipment, drugs, medical appliances, surgical instruments, etc. | 16,350 | 0 | 0 |
| Diets, medical comforts | 9,050 | 0 | 0 |
| Other items | 15,674 | 0 | 0 |
| Estimated total | 52,590 | 0 | 0 |
| Actual expenditure | 56,246 | 5 | 0 |

## RETURN B—*contd.*

### *Health.*

| | | | |
|---|---|---|---|
| Passages, transport, etc. ... ... ... ... ... ... | 5,956 | 0 | 0 |
| General votes ... ... ... ... ... ... ... ... | 33,816 | 0 | 0 |
| Scavengers and labourers ... ... ... ... ... ... | 29,352 | 0 | 0 |
| Estimated total ... ... ... ... ... ... | 69,124 | 0 | 0 |
| Actual expenditure ... ... ... ... ... | 67,363 | 1 | 1 |

### *Laboratory Service.*

| | | | |
|---|---|---|---|
| Passages, transport, etc. ... ... ... ... ... ... | 448 | 0 | 0 |
| General Research votes ... ... ... ... ... ... | 536 | 0 | 0 |
| Extimated total ... ... ... ... ... ... | 984 | 0 | 0 |
| Actual expenditure ... ... ... ... ... | 1,185 | 15 | 4 |

| | | | |
|---|---|---|---|
| Estimated total expenditure, Medical Department (all branches) | 298,810 | 0 | 0 |
| Actual total expenditure, Medical Department (all branches) ... | 293,430 | 7 | 4 |
| Revenue earned by Medical branch :— | | | |
| (*a*) Hospital fees ... ... ... ... ... ... | 12,464 | 16 | 7 |
| (*b*) Sale of drugs in private practice ... ... ... | 392 | 10 | 3 |
| (*c*) Reimbursement by Railway Department and Takoradi Harbour ... ... ... ... | 1,998 | 0 | 0 |
| Total ... ... ... ... | 14,855 | 6 | 10 |

| | | | |
|---|---|---|---|
| Revenue earned by Health branch :— | | | |
| (*a*) Fines for sanitary offences ... ... ... ... | 5,728 | 14 | 6 |
| (*b*) Market and slaughter-house fees ... ... ... | 19,514 | 3 | 9 |
| (*c*) Poundage fees ... ... ... ... ... ... | 313 | 19 | 9 |
| (*d*) Births, deaths and burials ... ... ... ... | 802 | 18 | 6 |
| (*e*) Reimbursement by Railway Department and Takoradi Harbour ... ... ... ... | 2,315 | 0 | 0 |
| (*f*) Conservancy fees ... ... ... ... ... | 8,819 | 2 | 8 |
| (*g*) Fees collected at welfare centres ... ... ... | 3,369 | 19 | 2 |
| Total ... ... ... ... | £40,863 | 18 | 4 |

# RETURN C.

## *Health Branch.*

### POPULATION OF THE GOLD COAST AND ITS DEPENDENCIES, MID-YEAR 1935.

| | Census 1921. | Census 1931. | | | Mid-Year 1935. |
|---|---|---|---|---|---|
| | | Males. | Females. | Persons. | |
| A.—*Resident Africans.* | | | | | |
| 1. Colony... ... ... | 1,171,913 | 806,466 | 764,828 | 1,571,294 | 1,741,031 |
| 2. Ashanti ... ... | 406,193 | 298,341 | 279,737 | 578,078 | 651,129 |
| 3. Northern Territories | 530,355 | 360,260 | 357,015 | 717,275 | 796,716 |
| 4. Togoland under British Mandate ... ... | 187,939 | 150,464 | 143,207 | 293,671 | 338,607 |
| Total ... ... | 2,296,400 | 1,615,531 | 1,544,787 | 3,160,318 | 3,527,483 |
| B.—*Resident Non-Africans.* | | | | | |
| 1. Colony... ... ... | 1,530 | 1,839 | 465 | ,304 | 2,304 |
| 1. Ashanti ... ... | 447 | 491 | 133 | 624 | 624 |
| 3. Northern Territories | 36 | 89 | 18 | 107 | 107 |
| 4. Togoland under British Mandate ... ... | 20 | 33 | 10 | 43 | 43 |
| Total ... ... | 2,033 | 2,452 | 626 | 3,078 | 3,078 |
| C—*Maritime.* | | | | | |
| 1. Africans ... ... | 1,157 | 68 | — | 68 | 68 |
| 2. Non-Africans ... | 371 | 104 | — | 104 | 104 |
| Total ... ... | 1,528 | 172 | — | 172 | 172 |
| D.—*The Gold Coast and its Dependencies.* | | | | | |
| 1 . Africans :— | | | | | |
| (*a*) Resident ... | 2,108,461 | 1,465,067 | 1,401,580 | 2,866,647 | 3,188,876 |
| (*b*) Maritime ... | 1,157 | 68 | — | 68 | 68 |
| Total ... ... | 2,109,618 | 1,465,135 | 1,401,580 | 2,866,715 | 3,188,944 |
| 2. Non-Africans :— | | | | | |
| (*a*) Resident ... | 2,013 | 2,419 | 616 | 3,035 | 3,035 |
| (*b*) Maritime ... | 371 | 104 | — | 104 | 104 |
| Total ... ... | 2,384 | 2,523 | 16 | 3,139 | 3,139 |
| E.—*Togoland under British Mandate.* | | | | | |
| 1. Africans ... ... | 187,939 | 150,464 | 143,207 | 293,671 | 338,607 |
| 2. Non-Africans ... | 20 | 33 | 10 | 43 | 43 |
| Total ... ... | 187,959 | 150,497 | 143,217 | 293,714 | 338,650 |
| Grand Total ... | 2,299,961 | 1,618,155 | 1,545,413 | 3,163,568 | 3,530,733 |

## RETURN D.

Return of diseases and deaths (In-patients) and diseases (Out-patients) for the year, 1935.

# RETURN D.

## RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1935.

| DISEASES. | IN-PATIENTS. | | | | | OUT-PATIENTS. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. Admissions. | Yearly Total. Deaths. | Total cases treated. | Remaining in hospital on 31st Dec., 1935. | Male. | Female. |
| 1.—*Epidemic, endemic, and infectious diseases.* | | | | | | | |
| 1. Enteric group— | | | | | | | |
| (*a*) Typhoid fever | 5 | 33 | 12 | 38 | 1 | 15 | 4 |
| (b) Paratyphoid A. ... | — | 2 | — | 2 | — | — | — |
| (*c*) Paratyphoid B. ... | — | — | — | — | — | — | — |
| (*d*) Type not defined | — | 3 | — | 3 | 1 | — | — |
| 2. Typhus ... ... ... | — | — | — | — | — | — | — |
| 3. Relapsing fever ... | — | 1 | — | 1 | — | 1 | 1 |
| 4. Undulant fever ... ... | — | — | — | — | — | — | — |
| 5. Malaria— | | | | | | | |
| (*a*) Tertian ... ... | 1 | 75 | 6 | 76 | 2 | 251 | 104 |
| (*b*) Quartan ... ... | — | 15 | 1 | 15 | 1 | 28 | 18 |
| (*c*) Aestivo-autumnal | 34 | 1,494 | 43 | 1,528 | 21 | 8,632 | 5,610 |
| (*d*) Cachexia ... ... | — | 17 | 1 | 17 | — | 220 | 139 |
| (*e*) Blackwater ... | — | 11 | 2 | 11 | 1 | 4 | 1 |
| (*f*) Unclassified ... | 6 | 138 | 6 | 144 | 3 | 4,945 | 4,113 |
| 6. Smallpox ... ... | — | — | — | — | — | — | — |
| 7. Measles ... ... ... | — | 19 | — | 19 | 1 | 175 | 126 |
| 8. Scarlet fever ... ... | — | — | — | — | — | — | — |
| 9. Whooping cough ... | — | 5 | — | 5 | — | 464 | 543 |
| 10. Diphtheria ... ... | — | 7 | 1 | 7 | — | 2 | 3 |
| 11. Influenza ... ... | 2 | 230 | — | 232 | 1 | 851 | 250 |
| 12. Miliary fever ... ... | — | — | — | — | — | 2 | — |
| 13. Mumps ... ... ... | 1 | 24 | — | 25 | — | 114 | 21 |
| 14. Cholera ... ... ... | — | — | — | — | — | — | — |
| 15. Epidemic diarrhœa ... | — | 1 | — | 1 | — | 4 | — |
| 16. Dysentery— | | | | | | | |
| (*a*) Amœbic ... ... | 7 | 179 | 25 | 186 | 6 | 308 | 184 |
| (*b*) Bacillary ... ... | — | 123 | 14 | 123 | — | 63 | 30 |
| (*c*) Undefined or due to other causes ... | — | 60 | 7 | 60 | 3 | 176 | 96 |
| 17. Plague— | | | | | | | |
| (*a*) Bubonic ... ... | — | — | — | — | — | — | — |
| (*b*) Pneumonic ... | — | — | — | — | — | — | — |
| (*c*) Septicæmic ... | — | — | — | — | — | — | — |
| (*d*) Undefined ... | — | — | — | — | — | — | — |
| 18. Yellow fever ... ... | — | 7 | 4 | 7 | — | — | — |
| 19. Spirochætosis icterohæmorrhagica ... | — | — | — | — | — | — | — |
| 20. Leprosy ... ... ... | 444 | 187 | 25 | 631 | 413 | 574 | 273 |
| 21. Erysipelas ... ... | — | 6 | — | 6 | — | 2 | 7 |
| 22. Acute poliomyelitis ... | — | — | — | — | — | 6 | 4 |
| 23. Encephalitis lethargica ... | — | 1 | — | 1 | — | 1 | — |
| 24. Epidemic cerebro-spinal fever ... ... ... | — | 1 | 1 | 1 | — | — | 1 |
| 25. Other epidemic diseases— | | | | | | | |
| (*a*) Rubeola (German measles) ... | — | 6 | — | 6 | — | 13 | 4 |
| (*b*) Varicella ( chicken-pox) ... ... | 16 | 261 | — | 277 | 8 | 288 | 33 |
| (*c*) Kala-azar ... | — | — | — | — | — | — | — |
| (*d*) Phlebotomus fever | — | — | — | — | — | 1 | — |
| (*e*) Dengue ... ... | — | 8 | — | 8 | 1 | 13 | 1 |
| (*f*) Epidemic dropsy | — | — | — | — | — | — | — |
| (*g*) Yaws ... ... | 57 | 288 | 6 | 345 | 22 | 37,261 | 29,142 |
| (*h*) Trypanosomiasis | 245 | 2,074 | 116 | 2,319 | 360 | 1,011 | 595 |
| 26. Glanders ... ... | — | — | — | — | — | — | — |
| 27. Anthrax ... ... ... | — | 1 | 1 | 1 | — | 1 | — |
| 28. Rabies ... ... ... | — | 4 | 2 | 4 | — | 7 | 1 |
| 29. Tetanus ... ... ... | 2 | 63 | 36 | 65 | 2 | 27 | 13 |
| 30. Mycosis ... ... ... | — | 1 | — | 1 | — | 13 | 5 |
| 31. Tuberculosis, pulmonary and laryngeal ... | 29 | 377 | 196 | 406 | 21 | 509 | 167 |
| 32. Tuberculosis of the meninges or central nervous system ... | — | 10 | 5 | 10 | — | 3 | 2 |
| 33. Tuberculosis of the intestines or peritoneum ... | — | 9 | 5 | 9 | — | 6 | 1 |
| 34. Tuberculosis of the vertebral column ... | 5 | 16 | 5 | 21 | 4 | 27 | 14 |

## RETURN D—*continued.*

## RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR 1935.

| DISEASES. | IN-PATIENTS. | | | | | OUT-PATIENTS. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1934. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| I.—*Epidemic, endemic and infectious diseases* (contd.) | | | | | | | |
| 35. Tuberculosis of bones and joints ... ... ... | 6 | 11 | 1 | 17 | 7 | 19 | 8 |
| 36. Tuberculosis of other organs— | | | | | | | |
| (*a*) skin or subcutaneous tissue (lupus) ... | — | 1 | — | 1 | — | 1 | — |
| (*b*) Bones ... ... | — | 2 | 1 | 2 | — | — | — |
| (*c*) Lymphatic system | 4 | 15 | 1 | 19 | 4 | 12 | 2 |
| (*d*) Genito-urinary ... | 1 | 1 | 2 | 2 | — | — | — |
| (*e*) Other organs ... | — | 6 | — | 6 | — | 1 | 1 |
| 37. Tuberculosis disseminated— | | | | | | | |
| (*a*) Acute ... ... | — | 1 | — | 1 | 1 | — | — |
| (*b*) Chronic ... ... | — | — | — | — | — | — | 1 |
| 38. Syphilis— | | | | | | | |
| (*a*) Primary ... ... | — | 21 | — | 21 | 1 | 104 | 16 |
| (*b*) Secondary... ... | — | 22 | — | 22 | 5 | 82 | 21 |
| (*c*) Tertiary ... ... | 3 | 45 | 8 | 48 | 8 | 155 | 134 |
| (*d*) Hereditary ... | — | 13 | 3 | 13 | — | 29 | 26 |
| (*e*) Period not indicated | — | 18 | 2 | 18 | — | 14 | 15 |
| 39. Soft chancre ... ... | 4 | 44 | — | 48 | 6 | 147 | 5 |
| 40. A.—Gonorrhœa and its complications ... | 15 | 318 | 1 | 333 | 12 | 2,989 | 291 |
| B.—Gonorrhœal ophthalmia ... ... ... | 2 | 37 | — | 39 | 1 | 153 | 89 |
| C.—Gonorrhœal arthritis | 2 | 53 | 2 | 55 | 2 | 228 | 40 |
| D.—Granuloma venereum | 2 | 5 | — | 7 | — | 3 | 5 |
| 41. Septicæmia ... ... | 1 | 27 | 17 | 28 | — | 4 | 3 |
| 42. Other infectious diseases | — | — | — | — | — | 2 | 8 |
| II.—*General Diseases not mentioned above.* | | | | | | | |
| 43. Cancer or other malignant tumours of the buccal cavity ... | — | 5 | 3 | 5 | — | 1 | — |
| 44. Cancer or other malignant tumours of the stomach or liver ... | — | 15 | 10 | 15 | — | 8 | 1 |
| 45. Cancer or other malignant tumours of the peritoneum, intestines, rectum ... ... | — | 6 | 5 | 6 | 1 | 1 | — |
| 46. Cancer or other malignant tumours of the female genital organs | 1 | 3 | — | 4 | — | — | 11 |
| 47. Cancer or other malignant tumours of the breast ... ... ... | — | 1 | 1 | 1 | — | 1 | 4 |
| 48. Cancer or other malignant tumours of the skin ... ... ... | — | 12 | 3 | 12 | — | 3 | 5 |
| 49. Cancer or other malignant tumours of organs not specified ... ... | 1 | 11 | 2 | 12 | 1 | 23 | 12 |
| 50. Tumours non-malignant | 5 | 74 | 1 | 79 | 1 | 266 | 108 |
| 51. Acute rheumatism ... | — | 6 | — | 6 | — | 6 | 4 |
| 52. Chronic rheumatism ... | 3 | 104 | 1 | 107 | 4 | 4,055 | 2,198 |
| 53. Scurvy (including Barlow's disease) ... | — | — | — | — | — | 9 | 4 |
| 54. Pellagra ... ... ... | 1 | 2 | — | 3 | — | 7 | 3 |
| 55. A.—Beri-beri ... ... | 2 | 3 | 2 | 5 | — | 3 | — |
| B.—Avitaminosis ... | — | 18 | 2 | 18 | 3 | 52 | 61 |
| 56. Rickets ... ... ... | 1 | 1 | — | 2 | — | 8 | 5 |
| 57. Diabetes (not including insipidus) ... ... | — | 21 | 3 | 21 | 1 | 24 | 8 |
| 58. Anæmia— | | | | | | | |
| (*a*) Pernicious... ... | — | 2 | — | 2 | — | 2 | — |
| (*b*) Other anæmias and chlorosis ... | 3 | 97 | 20 | 100 | 7 | 260 | 285 |

## RETURN D—*continued.*

### Return of Diseases and Deaths (In-Patients) and Diseases (Out-Patients) for the Year 1935.

| Diseases. | In-Patients. | | | | | Out-Patients. | |
|---|---|---|---|---|---|---|---|
| | Remainin in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1934. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| II.—*General diseases not mentioned above* (contd | | | | | | | |
| 59. Diseases of the pituitary body ... ... ... | — | 1 | — | 1 | 1 | 1 | — |
| 60. Diseases of the thyroid gland— | | | | | | | |
| (*a*) Exophthalmic goitre | — | — | — | — | — | 11 | 18 |
| (*b*) Other diseases of the thyroid gland, myxœdema ... | — | 7 | — | 7 | — | 18 | 28 |
| 61. Diseases of the parathyroid glands ... | — | — | — | — | — | 1 | — |
| 62. Diseases of the thymus | — | — | — | — | — | — | — |
| 63. Diseases of the suprarenal glands ... ... | — | — | — | — | — | 1 | 1 |
| 64. Disease of the spleen ... | 2 | 14 | 2 | 16 | — | 77 | 73 |
| 65. Leukæmia— | | | | | | | |
| (*a*) Leukæmia... ... | — | 1 | — | 1 | — | — | 2 |
| (*b*) Hodgkin's disease | — | — | — | — | — | 3 | — |
| 66. Alcoholism ... ... | — | 11 | — | 11 | — | 6 | — |
| 67. Chronic poisoning by mineral substances (lead, mercury, etc.) ... | — | — | — | — | — | 2 | 2 |
| 68. Chronic poisoning by organic substances (morphia, cocaine, etc.) | — | — | — | — | — | 1 | — |
| 69. Other general diseases— | | | | | | | |
| (*a*) Auto-intoxication | — | — | — | — | — | — | — |
| (*b*) Purpura hæmorrhagica ... ... | — | — | — | — | — | 1 | — |
| (*c*) Hæmophilia ... | — | — | — | — | — | — | — |
| (*d*) Diabetes insipidus | — | — | — | — | — | — | — |
| III.—*Affections of the nervous system and organs of the senses.* | | | | | | | |
| 70. Encephalitis (not including encephalitis lethargica) ... ... | — | 4 | 3 | 4 | — | 5 | 3 |
| 71. Meningitis (not including tuberculous meningitis or cerebrospinal meningitis) ... ... | — | 38 | 30 | 38 | — | 3 | 8 |
| 72. Locomotor ataxia ... | — | — | — | — | — | 2 | — |
| 73. Other affections of the spinal cord ... ... | 1 | 6 | 2 | 7 | — | 13 | 4 |
| 74. Apoplexy— | | | | | | | |
| (*a*) Hæmorrhage ... | — | 25 | 12 | 25 | — | 8 | 2 |
| (*b*) Embolism ... | 1 | 3 | 1 | 4 | — | 3 | — |
| (*c*) Thrombosis ... | 1 | 14 | 3 | 15 | — | 15 | 7 |
| 75. Paralysis— | | | | | | | |
| (*a*) Hemiplegia ... | 7 | 43 | 10 | 50 | 7 | 65 | 20 |
| (*b*) Other paralyses ... | 5 | 53 | 2 | 58 | 9 | 118 | 28 |
| 76. General paralysis of the insane ... ... ... | — | 1 | — | 1 | — | 2 | — |
| 77. Other forms of mental alienation ... ... | 371 | 127 | 3 | 498 | 395 | 26 | 7 |
| 78. Epilepsy ... ... | 20 | 52 | 9 | 72 | 19 | 92 | 36 |
| 79. Eclampsia, convulsions (non-puerperal) 5 years or over ... ... | — | 1 | — | 1 | — | 15 | 3 |
| 80. Infantile convulsions ... | 1 | 20 | 5 | 21 | — | 29 | 28 |
| 81. Chorea ... ... ... | — | — | — | — | — | — | 1 |
| 82. A.—Hysteria ... ... | — | 8 | — | 8 | — | 13 | 12 |
| B.—Neuritis ... ... | 1 | 11 | — | 12 | 1 | 166 | 67 |
| C.—Neurasthenia ... | 2 | 34 | 1 | 36 | — | 60 | 28 |
| 83. Cerebral softening ... | — | 3 | — | 3 | — | 9 | 3 |
| 84. Other affections of the nervous system, such as paralysis agitans ... | 2 | 19 | 2 | 21 | 2 | 67 | 20 |

## RETURN D—*continued.*

### Return of Diseases and Deaths (In-Patients) and Diseases (Out-Patients) for the Year 1935.

| Diseases. | In-Patients. | | | | | Out-Patients. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1935. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| III.—*Affections of the nervous system and organs of the senses* (contd.) | | | | | | | |
| 85. Affections of the organs of vision— | | | | | | | |
| (*a*) Diseases of the eye | 1 | 53 | — | 54 | 3 | 426 | 168 |
| (*b*) Conjunctivitis ... | 9 | 182 | — | 191 | 9 | 3,491 | 2,598 |
| (*c*) Trachoma ... | — | 1 | — | 1 | — | 18 | 14 |
| (*d*) Tumours of the eye | 1 | 3 | 1 | 4 | — | 7 | 1 |
| (*e*) Other affections of the eye ... ... | 3 | 171 | 1 | 174 | 8 | 923 | 365 |
| 86. Affections of the ear or mastoid sinus ... | 4 | 69 | 1 | 73 | — | 1,767 | 1,127 |
| IV.—*Affections of the circulatory system.* | | | | | | | |
| 87. Pericarditis ... ... | — | 8 | 6 | 8 | — | 5 | 2 |
| 88. Acute endocarditis or myocarditis ... ... | — | 13 | 4 | 13 | 2 | 16 | 2 |
| 89. Angina pectoris ... | — | 4 | 1 | 4 | — | 7 | 2 |
| 90. Other diseases of the heart— ... ... | — | 10 | 4 | 10 | — | 13 | 6 |
| A.—Valvular— ... | — | 4 | — | 4 | — | 10 | 3 |
| (*a*) Mitral ... ... | 3 | 32 | 11 | 35 | 1 | 86 | 46 |
| (*b*) Aortic ... ... | — | 14 | 3 | 14 | 1 | 31 | 14 |
| (*c*) Tricuspid ... ... | — | — | — | — | — | — | — |
| (*d*) Pulmonary ... | — | — | — | — | — | — | — |
| B.—Myocarditis ... | — | 44 | 21 | 44 | 5 | 94 | 54 |
| 91. Diseases of the arteries— | | | | | | | |
| (*a*) Aneurism ... ... | 2 | 7 | 1 | 9 | 1 | 14 | 1 |
| (*b*) Arterio-sclerosis ... | — | — | — | — | — | 28 | 4 |
| (*c*) Other diseases ... | 1 | 8 | 1 | 9 | — | 21 | 13 |
| 92. Embolism or thrombosis non-cerebral ... ... | — | 1 | — | 1 | — | 1 | — |
| 93. Diseases of the veins— | | | | | | | |
| (*a*) Hæmorrhoids ... | 2 | 72 | 1 | 74 | 7 | 275 | 71 |
| (*b*) Varcose veins ... | — | 1 | — | 1 | — | 13 | 31 |
| (*c*) Phlebitis ... ... | — | 2 | — | 2 | — | 8 | — |
| 94. Diseases of the lymphatic system— | | | | | | | |
| (*a*) Lymphangitis ... | — | 15 | — | 15 | — | 53 | 15 |
| (*b*) Lymphandenitis, bubo (non-specific) ... | 7 | 200 | 1 | 207 | 12 | 556 | 136 |
| 95. Hæmorrhage of undetermined cause ... | — | 12 | 3 | 12 | — | 18 | 5 |
| 96. Other affections of the circulatory system ... | — | 7 | — | 7 | 2 | 11 | 12 |
| V.—*Affections of the respiratory system.* | | | | | | | |
| 97. Diseases of the nasal passages— | | | | | | | |
| (*a*) Adenoids ... ... | — | 8 | — | 8 | — | 30 | 6 |
| (*b*) Polypus ... ... | — | 6 | — | 6 | — | 17 | 9 |
| (*c*) Rhinitis ... ... | — | 3 | — | 3 | — | 87 | 55 |
| (*d*) Coryza ... ... | — | 71 | — | 71 | — | 2,089 | 824 |
| (*e*) Ill-defined ... | — | 2 | — | 2 | — | 23 | 21 |
| 98. Affections of the larynx— | | | | | | | |
| (*a*) Laryngitis... ... | — | 23 | 1 | 23 | — | 86 | 61 |
| 99. Bronchitis— | | | | | | | |
| (*a*) Acute ... ... | 7 | 264 | 10 | 271 | 6 | 4,562 | 2,530 |
| (*b*) Chronic ... ... | 3 | 115 | 19 | 118 | 3 | 2,967 | 1,924 |
| 100. Broncho-pneumonia ... | 1 | 201 | 77 | 202 | 3 | 160 | 123 |
| 101. Pneumonia— | | | | | | | |
| (*a*) Lobar ... ... | 8 | 428 | 126 | 436 | 18 | 251 | 101 |
| (*b*) Unclassified ... | 2 | 78 | 20 | 80 | 6 | 115 | 43 |
| 102. Pleurisy, empyema ... | 3 | 143 | 9 | 146 | 5 | 260 | 83 |
| 103. Congestion of the lungs | — | 6 | — | 6 | 1 | 15 | 9 |
| 104. Gangrene of the lungs ... | — | — | — | — | — | 2 | 4 |

## RETURN D—*continued.*

### RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR 1935.

| DISEASES. | IN-PATIENTS. | | | | | OUT-PATIENTS. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1935. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| V.—*Affections of the respiratory system.* (contd.) | | | | | | | |
| 105. Asthma ... ... ... | 2 | 41 | — | 43 | 1 | 159 | 81 |
| 106. Pulmonary emphysema | — | 3 | 1 | 3 | — | 4 | 3 |
| 107. Other affections of the lungs— ... ... | — | 6 | 2 | 6 | — | 11 | 6 |
| (*a*) Pulmonary spirochætosis ... | — | — | — | — | — | — | — |
| VI.—*Diseases of the digestive system.* | | | | | | | |
| 108. A.—Diseases of teeth or gums— ... ... | — | 8 | — | 8 | — | 101 | 39 |
| Caries, pyorrhœa, etc. ... | 3 | 68 | 1 | 71 | 2 | 1,983 | 1,112 |
| B.—Other affections of the mouth— ... | — | 6 | 3 | 6 | — | 30 | 25 |
| (*a*) Stomatitis... ... | — | 52 | 4 | 52 | 3 | 737 | 586 |
| (*b*) Glossitis, etc. ... | — | 13 | — | 13 | 4 | 146 | 217 |
| 109. Affections of the pharynx or tonsils— | | | | | | | |
| (*a*) Tonsillitis ... | — | 101 | — | 101 | — | 380 | 252 |
| (*b*) Pharyngitis ... | 1 | 21 | — | 22 | — | 450 | 204 |
| 110. Affections of the œsophagus ... ... ... | — | 3 | — | 3 | — | 12 | 3 |
| 111. A.—Ulcer of the stomach | — | 2 | 1 | 2 | — | 9 | 1 |
| B.—Ulcer of the duodenum ... ... ... | — | 6 | 1 | 6 | — | 6 | 2 |
| 112. Other affections of the stomach— | | | | | | | |
| (*a*) Gastritis ... ... | 2 | 64 | 2 | 66 | — | 247 | 118 |
| (*b*) Dyspepsia, etc. ... | — | 53 | 1 | 53 | 1 | 1,247 | 859 |
| 113 and 114. Diarrhœa and enteritis— | | | | | | | |
| A.—Under two years ... | — | 57 | 7 | 57 | 4 | 860 | 747 |
| B.—Two years and over | 6 | 278 | 14 | 284 | 5 | 1,415 | 663 |
| (*a*) Colitis ... ... | — | 76 | 3 | 76 | 1 | 301 | 144 |
| (*b*) Ulceration ... | — | 3 | 1 | 3 | — | 3 | 1 |
| (*c*) Other diseases ... | — | 15 | 2 | 15 | — | 100 | 50 |
| 114*a*. Sprue ... ... ... | — | — | — | — | — | — | — |
| 115. Ankylostomiasis ... | 6 | 128 | 11 | 134 | 4 | 173 | 67 |
| 116. Diseases due to intestinal parasites— | | | | | | | |
| (*a*) Cestoda (tænia) ... | 1 | 39 | — | 40 | 1 | 1,343 | 498 |
| (*b*) Tremotoda (flukes) | — | — | — | — | — | — | — |
| (*c*) Nematoda (other than ankylostoma)— ... | — | 1 | — | 1 | — | 8 | 2 |
| (i) Ascaris ... ... | 3 | 88 | 1 | 91 | 2 | 710 | 565 |
| (ii) Trichocephalus dispar ... | — | — | — | — | — | — | — |
| (iii) Trichina ... | — | 2 | — | 2 | — | 4 | 12 |
| (iv) Dracunculus | 6 | 206 | — | 212 | 8 | 569 | 263 |
| (v) Strongylus ... | — | 6 | — | 6 | — | 5 | 3 |
| (vi) Oxyuris ... | — | 23 | — | 23 | — | 27 | 32 |
| (*d*) Coccidia ... ... | — | — | — | — | — | — | — |
| (*e*) Other parasites ... | — | 5 | 1 | 5 | — | 9 | 6 |
| (*f*) Unclassified ... | — | 30 | — | 30 | — | 12 | 4 |
| 117. Appendicitis ... ... | 1 | 48 | 5 | 49 | 2 | 36 | 10 |
| 118. Hernia ... ... ... | 8 | 255 | 27 | 263 | 14 | 479 | 21 |
| 119. A.—Affections of the anus, fistula, etc. ... | 10 | 84 | 4 | 94 | 6 | 165 | 82 |
| B.—Other affections of the intestines— ... | — | 20 | 7 | 20 | 1 | 15 | 9 |
| (*a*) Enteroptosis ... | — | 1 | — | 1 | — | 10 | 9 |
| (*b*) Constipation ... | 2 | 129 | — | 131 | 5 | 8,282 | 2,633 |
| 120. Acute yellow atrophy of the liver ... ... | — | — | — | — | — | — | — |
| 121. Hydatid of the liver ... | — | — | — | — | — | 1 | — |
| 122. Cirrhosis of the liver— | | | | | | | |
| (*a*) Alcoholic ... ... | — | 1 | 1 | 1 | — | 4 | 1 |
| (*b*) Other forms ... | 1 | 22 | 15 | 23 | 1 | 21 | 5 |

## RETURN D—*continued.*

### RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR 1935.

| DISEASES. | IN-PATIENTS. | | | | | OUT-PATIENTS. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1934. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| VI.—*Diseases of the digestive system*—(contd.) | | | | | | | |
| 123. Biliary calculus ... | — | 2 | — | 2 | — | — | — |
| 124. Other affections of the liver— ... ... | — | — | — | — | — | 1 | — |
| (*a*) Abscess ... ... | 1 | 27 | 9 | 28 | — | 12 | 3 |
| (*b*) Hepatitis ... ... | 2 | 43 | 7 | 45 | 2 | 83 | 20 |
| (*c*) Cholecystitis ... | — | 8 | 1 | 8 | — | 6 | 5 |
| (*d*) Jaundice ... ... | 3 | 68 | 2 | 71 | 1 | 106 | 43 |
| 125. Diseases of the pancreas | — | — | — | — | — | 1 | 3 |
| 126. Peritonitis (of unknown cause) ... ... ... | — | 26 | 16 | 26 | — | 10 | 7 |
| 127. Other affections of the digestive system ... | — | 16 | 7 | 16 | — | 40 | 30 |
| VII.—*Diseases of the genito-urinary system* (*non-venereal*). | | | | | | | |
| 128. Acute nephritis ... ... | 2 | 69 | 17 | 71 | 4 | 83 | 47 |
| 129. Chronic nephritis ... | 7 | 80 | 15 | 87 | 7 | 101 | 59 |
| 130. A.—Chyluria ... ... | — | — | — | — | — | 3 | — |
| B.—Schistosomiasis ... | 5 | 102 | 4 | 107 | 2 | 371 | 69 |
| 131. Other affections of the kidneys— | | | | | | | |
| (*a*) Pyelitis, etc. ... | — | 31 | 5 | 31 | 1 | 28 | 9 |
| 132. Urinary calculus ... | — | 5 | — | 5 | — | 6 | 2 |
| 133. Diseases of the bladder— | — | 1 | — | 1 | — | 1 | 3 |
| (*a*) Cystitis ... ... | 8 | 104 | 10 | 112 | 11 | 322 | 214 |
| 134. Diseases of the urethra— | | | | | | | |
| (*a*) Stricture ... ... | 11 | 176 | 9 | 187 | 23 | 333 | 3 |
| (*b*) Other ... ... | 12 | 128 | 6 | 140 | 10 | 130 | 19 |
| 135. Diseases of the prostate— | | | | | | | |
| (*a*) Hypertrophy ... | 1 | 2 | — | 3 | — | 1 | — |
| (*b*) Prostatitis ... | 1 | 24 | — | 25 | 3 | 92 | — |
| 136. Diseases (non-venereal) of the genital organs of man— ... | — | 4 | — | 4 | — | 5 | — |
| (*a*) Epididymitis ... | 1 | 55 | — | 56 | 4 | 111 | — |
| (*b*) Orchitis ... ... | 6 | 112 | — | 118 | 6 | 303 | — |
| (*c*) Hydrocele ... | 4 | 75 | — | 79 | 10 | 244 | — |
| (*d*) Ulcer of penis ... | 11 | 121 | 2 | 132 | 11 | 351 | — |
| (*e*) Phimosis and paraphimosis ... ... | 10 | 135 | — | 145 | 5 | 258 | — |
| 137. Cysts or other non-malignant tumours of the ovaries ... ... | — | 8 | — | 8 | — | — | 26 |
| 138. Salpingitis ... ... | 3 | 65 | 1 | 68 | — | — | 100 |
| (*a*) Abscess of the pelvis | — | 5 | 1 | 5 | — | — | 73 |
| 139. Uterine tumours (non-malignant) ... ... | 1 | 35 | — | 36 | 1 | — | 84 |
| 140. Uterine hæmorrhage (non-puerperal) ... | — | 7 | — | 7 | — | — | 87 |
| 141. A.—Metritis ... ... | 3 | 68 | 1 | 71 | 1 | — | 528 |
| B.—Other affections of the female genital organs— ... | 4 | 42 | — | 46 | 2 | — | 91 |
| (*a*) Displacements of uterus ... ... | — | 16 | — | 16 | 1 | — | 121 |
| (*b*) Amenorrhœa ... | — | 5 | — | 5 | — | — | 322 |
| (*c*) Dysmenorrhœa ... | 1 | 25 | — | 26 | 1 | — | 735 |
| (*d*) Leucorrhœa ... | 1 | 21 | — | 22 | — | — | 185 |
| 142. Diseases of the breast (non-puerperal)— | | | | | | | |
| (*a*) Mastitis ... ... | — | 14 | — | 14 | 1 | 6 | 124 |
| (*b*) Abscess of breast... | — | 11 | — | 11 | — | 6 | 30 |

## RETURN D—*continued.*

## RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR 1935.

| Diseases. | In-Patients. | | | | | Out-Patients. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1934. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| VIII.—*Puerperal State.* | | | | | | | |
| 143. A.—Normal labour ... | 15 | 722 | 2 | 737 | 23 | — | 410 |
| B.—Accidents of pregnancy— | | | | | | | |
| (*a*) Abortion ... ... | 1 | 174 | — | 175 | 3 | — | 134 |
| (*b*) Ectopic gestation | 2 | 7 | — | 9 | 3 | — | 2 |
| (*c*) Other accidents of pregnancy ... | 8 | 215 | 36 | 223 | 6 | — | 167 |
| C.—Maternal welfare (ante-natal) ... ... | 15 | 878 | 7 | 893 | 13 | 2 | 14,010 |
| D.—Post-natal examinations—mothers and infant ... ... ... | — | 77 | 3 | 77 | 4 | 405 | 1,363 |
| 144. Puerperal hæmorrhage | — | 6 | 1 | 6 | — | — | 3 |
| 145. Other accidents of parturition ... ... | 5 | 204 | 36 | 209 | 7 | — | 13 |
| 146. Puerperal septicæmia ... | — | 26 | 9 | 26 | — | — | 9 |
| 147. Phlegmasia dolens ... | — | — | — | — | — | — | 1 |
| 148. Puerperal eclampsia | — | 15 | 6 | 15 | 1 | — | 1 |
| 149. Sequelæ of labour ... | 2 | 17 | 2 | 19 | 1 | — | 4 |
| 150. Puerperal affections of the breast ... ... | — | 2 | — | 2 | — | — | 23 |
| IX.—*Affections of the skin and cellular tissues.* | | | | | | | |
| 151. Gangrene ... ... | 2 | 26 | 10 | 28 | 5 | 28 | 16 |
| 152. Boil— ... ... ... | 3 | 96 | — | 99 | — | 988 | 308 |
| (*a*) Carbuncle | — | 30 | 3 | 30 | — | 193 | 35 |
| 153. Abscess— ... ... | 26 | 487 | 12 | 513 | 21 | 722 | 263 |
| (*a*) Whitlow ... | 3 | 82 | — | 85 | 6 | 443 | 124 |
| (*b*) Cellulitis ... | 20 | 443 | 20 | 463 | 20 | 919 | 271 |
| 154. A.—Tinea ... | — | 10 | — | 10 | — | 1,382 | 740 |
| B.—Scabies ... ... | 1 | 24 | — | 25 | — | 3,728 | 2,796 |
| 155. Other diseases of the skin | 1 | 33 | 1 | 34 | — | 1,008 | 705 |
| (*a*) Erythema ... | — | — | — | — | — | 209 | 158 |
| (*b*) Urticaria ... ... | — | 13 | — | 13 | — | 414 | 214 |
| (*c*) Eczema ... ... | 1 | 28 | — | 29 | 2 | 828 | 499 |
| (*d*) Herpes ... ... | — | 20 | — | 20 | — | 153 | 52 |
| (*e*) Psoriasis ... ... | 1 | 1 | — | 2 | — | 31 | 12 |
| (*f*) Elephantiasis ... | 8 | 66 | 1 | 74 | 14 | 148 | 36 |
| (*g*) Myiasis ... ... | — | 3 | — | 3 | 2 | 72 | 18 |
| (*h*) Chiggers ... ... | — | 1 | — | 1 | — | 10 | 3 |
| (*i*) Cutaneous leishmaniasis ... ... | — | — | — | — | — | — | — |
| (*j*) Ulcers ... | 126 | 1,150 | 13 | 1,276 | 114 | 8,710 | 4,402 |
| X.—*Diseases of bones and organs of locomotion* (*other than tuberculous*). | | | | | | | |
| 156. Diseases of bones— | | | | | | | |
| (*a*) Osteitis ... ... | 3 | 38 | 3 | 41 | 5 | 454 | 355 |
| (*b*) Osteo-myelitis ... | 10 | 61 | 3 | 71 | 13 | 93 | 63 |
| 157. Diseases of joints— | | | | | | | |
| (*a*) Arthritis ... ... | 14 | 217 | 5 | 231 | 15 | 1,615 | 852 |
| (*b*) Synovitis ... ... | 5 | 123 | — | 128 | 5 | 418 | 101 |
| 158. Other diseases of bones or organs of locomotion | 2 | 73 | 3 | 75 | 2 | 508 | 195 |
| (*a*) Fibrositis ... ... | 2 | 55 | 1 | 57 | — | 1,447 | 399 |
| XI.—*Malformations.* | | | | | | | |
| 159. Malformations— | | | | | | | |
| (*a*) Hydrocephalus | — | 2 | — | 2 | — | 6 | 2 |
| (*b*) Hypospadias ... | — | — | — | — | — | 1 | — |
| (*c*) Spina bifida, etc. | 1 | 10 | — | 11 | — | 24 | 20 |
| XII.—*Diseases of infancy.* | | | | | | | |
| 160. Congenital debility ... | — | 17 | 5 | 17 | — | 166 | 134 |
| 161. Premature birth | 2 | 116 | 59 | 118 | 2 | 56 | 40 |
| 162. Other affections of infancy | 2 | 136 | 32 | 138 | 14 | 334 | 331 |
| 163. Infant neglect (infants of three months or over) | — | 2 | 1 | 2 | — | 18 | 11 |
| (*a*) New born infants | 15 | 620 | 50 | 635 | 23 | 351 | 387 |

## RETURN D—*continued.*

### Return of Diseases and Deaths (In-Patients) and Diseases (Out-Patients) for the Year 1935.

| Diseases. | In-Patients. | | | | | Out-Patients. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1935. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| XIII.—*Affections of old age.* | | | | | | | |
| 164. Senility— ... ... | 1 | 9 | 6 | 10 | 1 | 37 | 35 |
| Senile dementia ... | 6 | 7 | 4 | 13 | 8 | 4 | 3 |
| XIV.—*Affections produced by external causes.* | | | | | | | |
| 165. Suicide by poisoning ... | — | 1 | 1 | 1 | — | 2 | — |
| 166. Corrosive poisoning (intentional) ... ... | — | 11 | 1 | 11 | — | — | — |
| 167. Suicide by gas poisoning | — | — | — | — | — | — | — |
| 168. Suicide by hanging or strangulation ... | — | 1 | 1 | 1 | — | — | — |
| 169. Suicide by drowning ... | — | — | — | — | — | — | — |
| 170. Suicide by firearms ... | — | 1 | 1 | 1 | — | — | — |
| 171. Suicide by cutting or stabbing instruments | — | 3 | 3 | 3 | — | — | — |
| 172. Suicide by jumping from a height ... ... | — | — | — | — | — | — | — |
| 173. Suicide by crushing ... | — | — | — | — | — | — | — |
| 174. Other suicides ... ... | — | — | — | — | — | — | — |
| (*a*) Attempted suicide | 1 | 17 | — | 18 | 2 | 3 | 2 |
| 175. Food poisoning— ... | — | 62 | 1 | 62 | — | 4 | 1 |
| (*a*) Botulism ... ... | — | — | — | — | — | — | — |
| 176. Attacks of poisonous animals— | | | | | | | |
| (*a*) Snake bite ... | 1 | 68 | 2 | 69 | — | 54 | 11 |
| (*b*) Insect bite or sting | — | 17 | — | 17 | — | 151 | 43 |
| 177. Other accidental poisonings ... ... ... | 1 | 18 | 4 | 19 | — | 29 | 15 |
| 178. Burns (by fire) ... ... | 4 | 91 | 21 | 95 | 11 | 196 | 130 |
| 179. Burns (other than by fire) | 3 | 26 | 3 | 29 | 2 | 123 | 51 |
| 180. Suffocation (accidental) | — | 3 | — | 3 | — | 1 | — |
| 181. Poisoning by gas (accidental) ... ... | — | 4 | — | 4 | — | 3 | — |
| 182. Drowning (accidental) ... | — | — | — | — | — | — | — |
| 183. Wounds (by firearms, war excepted) ... ... | 6 | 113 | 13 | 119 | 4 | 64 | 8 |
| 184. Wounds (by cutting or stabbing instruments) | 35 | 808 | 23 | 843 | 44 | 3,764 | 462 |
| 185. Wounds (by fall) ... | 10 | 246 | 11 | 256 | 13 | 1,138 | 224 |
| 186. Wounds (in mines or quarries) ... ... | 4 | 211 | 2 | 215 | 4 | 1,983 | — |
| 187. Wounds (by machinery) | 2 | 49 | 2 | 51 | 2 | 569 | 18 |
| 188. Wounds (crusing, e.g. railway accidents, etc.) | 8 | 299 | 37 | 307 | 10 | 399 | 58 |
| 189. Injuries inflicted by animals, bites, kicks, etc. ... ... ... | 2 | 88 | 2 | 90 | 3 | 458 | 151 |
| 190. Wounds inflicted on active service ... | — | — | — | — | — | 2 | — |
| 191. Executions of civilians by belligerents ... ... | — | — | — | — | — | — | — |
| 192. A.—Over-fatigue ... | — | 2 | — | 2 | — | 4 | 1 |
| B.—Hunger or thirst ... | — | 15 | 9 | 15 | — | 3 | — |
| 193. Exposure to cold, frost bite, etc. ... ... | — | — | — | — | — | — | — |
| 194. Exposure to heat— | | | | | | | |
| (*a*) Heatstroke ... | — | — | — | — | — | 1 | 1 |
| (*b*) Sunstroke ... | — | 3 | — | 3 | — | 3 | — |
| 195. Lightning stroke ... | — | 2 | — | 2 | — | — | — |
| 196. Electric shock ... ... | — | 1 | — | 1 | — | 2 | — |
| 197. Murder by firearms ... | — | — | — | — | — | — | — |
| 198. Murder by cutting or stabbing instruments | — | 1 | 1 | 1 | — | — | — |
| 199. Murder by other means | — | — | — | — | — | — | 1 |
| 200. Infanticide (murder of an infant under one year) | — | — | — | — | — | — | — |
| 201. A.—Dislocation ... | 1 | 44 | — | 45 | 2 | 61 | 20 |
| B.—Sprain ... ... | 2 | 74 | — | 76 | 1 | 565 | 76 |
| C.—Fracture ... ... | 37 | 451 | 37 | 488 | 50 | 296 | 81 |
| 202. Other external injuries | 16 | 393 | 11 | 409 | 15 | 2,016 | 494 |
| 203. Deaths by violence of unknown cause ... | — | — | — | — | — | — | — |

## RETURN D—*continued.*

## RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR 1935.

| DISEASES. | IN-PATIENTS. | | | | | OUT-PATIENTS. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec. 1934. | Yearly Total. Admissions. | Yearly Total. Deaths. | Total cases treated. | Remainin in hospital on 31st Dec. 1934. | Male. | Female. |
| XV.—*Ill-defined diseases.* | | | | | | | |
| 204. Sudden death (cause unknown) ... ... | — | — | — | — | — | — | — |
| 205. A.—Diseases not already specified or ill-defined | | | | | | | |
| (*a*) Ascites ... ... | 2 | 36 | 15 | 38 | 2 | 37 | 15 |
| (*b*) Œdema ... ... | 1 | 22 | 4 | 23 | 2 | 99 | 35 |
| (*c*) Asthenia ... ... | 4 | 144 | 39 | 148 | 2 | 580 | 333 |
| (*d*) Shock ... ... | — | 26 | 4 | 26 | — | 14 | 2 |
| (*e*) Hyperpyrexia ... | — | 3 | 1 | 3 | — | 5 | 3 |
| (*f*) Neuralgia and Headache (undiagnosed) ... | — | 29 | — | 29 | — | 557 | 260 |
| (*g*) Other diseases ... | 3 | 95 | 5 | 98 | 1 | 308 | 170 |
| B.—Malingering ... | — | 25 | — | 25 | — | 64 | 2 |
| C.—Observation cases ... | 6 | 179 | 4 | 185 | 21 | 311 | 105 |
| D.—Pyrexia of uncertain origin ... ... ... | 2 | 131 | 3 | 133 | 5 | 351 | 91 |
| XVI.—*Diseases, the total of which have not caused ten deaths.* | — | 1 | — | 1 | — | 18 | 14 |
| Total ... | 1,986 | 23,411 | 1,841 | 25,397 | 2,165 | 147,330 | 100,749 |

Major operations ... ... 1,213

Minor operations ... ... 3,933

## RETURN E.

| | In-Patients. | | | | | Out-Patients. | |
|---|---|---|---|---|---|---|---|
| | Remaining in hospital on 31st Dec., 1934. | Yearly Total. | | Total cases treated. | Remaining in hospital on 31st Dec., 1935. | Male. | Female. |
| | | Admissions. | Deaths. | | | | |
| Medical ... ... ... | 1,835 | 21,797 | 1,656 | 23,632 | 1,991 | 132,196 | 75,507 |
| Health Branch :— | | | | | | | |
| Welfare Centres ... ... | 49 | 1,208 | 136 | 1,257 | 61 | 15,117 | 25,231 |
| Contagious Diseases Hospitals ... ... | 102 | 406 | 49 | 508 | 113 | 17 | 11 |
| | 1,986 | 23,411 | 1,841 | 25,397 | 2,165 | 147,330 | 100,749 |

## RETURN F.

### ANALYSIS OF MORE IMPORTANT CONDITIONS DEALT WITH IN THE OUT-PATIENTS DEPARTMENT OF THE CHILD WELFARE CENTRES DURING 1935.

| Diseases. | Male. | Female. | Total. | Ratio to diseases due to all causes. |
|---|---|---|---|---|
| Malaria ... ... ... ... ... ... | 5,629 | 5,504 | 11,133 | 27·59 |
| Yaws ... ... ... ... ... ... ... | 2,993 | 2,690 | 5,683 | 14·08 |
| Diseases of respiratory system ... ... | 1,442 | 1,394 | 2,836 | 7·03 |
| Parasitic skin diseases ... ... ... | 366 | 391 | 757 | 1·88 |
| Constipation ... ... ... ... ... | 378 | 400 | 778 | 1·93 |
| Diarrhœa and enteritis ... ... ... | 487 | 440 | 927 | 2·30 |
| Diseases of teeth, gums and mouth ... | 407 | 527 | 934 | 2·31 |
| Diseases of infancy ... ... ... ... | 805 | 819 | 1,624 | 4·02 |
| Intestinal parasites ... ... ... ... | 239 | 257 | 496 | 1·23 |
| Diseases of the eye ... ... ... ... | 143 | 165 | 308 | 0·76 |
| Whooping cough ... ... ... ... | 238 | 312 | 550 | 1·36 |
| Ulcers ... ... ... ... ... ... ... | 184 | 228 | 412 | 1·02 |
| Dysentery ... ... ... ... ... ... | 68 | 37 | 105 | 0·26 |
| Injuries (external causes) ... ... ... | 120 | 91 | 211 | 0·52 |
| Diseases of lymphatic system ... ... | 22 | 35 | 57 | 0·14 |
| Measles ... ... ... ... ... ... ... | 50 | 59 | 109 | 0·27 |
| Other conditions ... ... ... ... | 1,546 | 11,882 | 13,428 | 33·28 |
| Total ... ... | 15,117 | 25,231 | 40,348 | — |

# APPENDICES.

# APPENDIX I.

## GOVERNMENT HOSPITAL BED ACCOMMODATION AND DISPENSARIES, GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH SPHERE OF TOGOLAND, MEDICAL BRANCH.

| COLONY.<br>EASTERN PROVINCE. | HOSPITAL. | | EUROPEAN. | | | | AFRICAN. | | | | Dispensaries. | Medical staff (medical officers and women medical officers). | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | European. | African. | Total beds at present. | | Number of beds possible. | | Total beds at present. | | Number of beds possible. | | | | |
| | | | M. | F. | M. | F. | M. | F. | M. | F. | | | |
| Accra ... ... ... ... ... | 1 | 1 | 15 | 3 | 15 | 3 | 179+7 cots | 49+11 cots | 170+7 cots | 49+11 cots | 2 | 5 (M.O.s.) | |
| Accra. Cantonments ... ... ... | — | 1 | — | — | — | — | 6 | — | 6 | — | 1 | 1 (M.O.) | |
| Accra Maternity ... ... ... | — | 1 | — | — | — | — | — | 48+29 cots | — | 32+20 cots | — | 2 (W.M.O.s.) | |
| Accra Princess Marie Louise Hospital | — | 1 | — | — | — | — | — | 3+25 cots | — | 3+25 cots | 1 | 1 (W.M.O.) | A children's hospital and welfare centre. |
| Accra, Christiansborg ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | 1 (W.M.O.) | Welfare centre—closed. |
| Ada ... ... ... ... ... | — | 1 | — | — | — | — | 7 | 4 | 7 | 4 | 1 | 1 (M.O.) | |
| Akuse ... ... ... ... ... | — | 1 | — | — | — | — | 12 | 6 | 12 | 6 | 1 | 1 (M.O.) | |
| Keta ... ... ... ... ... | — | 1 | — | — | — | — | 22 | 10 | 22 | 10 | 1 | 1 (M.O.) | |
| Kibi ... ... ... ... ... | — | 1 | — | — | — | — | 16 | 4 | 16 | 4 | 1 | 1 (M.O.) | |
| Koforidua ... ... ... ... | — | 1 | — | — | — | — | 20 | 6 | 20 | 6 | 1 | 1 (M.O.) | |
| Koforidua ... ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | 1 (W.M.O.) | Welfare centre. |
| Mpræso ... ... ... ... ... | — | 1 | — | — | — | — | 8 | 6 | 8 | 8 | 1 | 1 (M.O.) | |
| Nsawam ... ... ... ... | — | 1 | — | — | — | — | 9 | 3 | 9 | 3 | 1 | 1 (M.O.) | |
| Total ... ... ... | 1 | 11 | 15 | 3 | 15 | 3 | 279+7 | 139+65 | 270+7 | 125+56 | 13 | 18 | |

## APPENDIX I—*contd.*

### Government Hospital Bed Accommodation and Dispensaries, Gold Coast Colony, Ashanti, Northern Territories and British Sphere of Togoland, Medical Branch.

| Colony.<br>Central Province. | Hospital. | | European. | | | | African. | | | | Dispensaries. | Medical staff (medical officers and women medical officers). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | European. | African. | Total beds at present. | | Number of beds possible. | | Total beds at present. | | Number of beds possible. | | | | |
| | | | M. | F. | M. | F. | M. | F. | M. | F. | | | |
| Cape Coast ... ... ... ... | 1 | 1 | 2 | — | 3 | — | 22 | 19 | 24 | 22 | 1 | 1 (M.O.) | |
| Cape Coast ... ... ... ... | — | — | — | — | — | — | — | — | — | 4+6 cots | 1 | 1 Red Cross sister. | Red Cross welfare centre. |
| Dunkwa ... ... ... ... | — | 1 | — | — | — | — | 10 | 5 | 21 | 4 | 1 | 1 (M.O.) | |
| Elmina ... ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | 1 (M.O.) | Visited from Cape Coast. |
| Oda ... ... ... ... | — | 1 | — | — | — | — | 14 | 4 | 15+2 cots | 4+1 cot | 1 | 1 (M.O.) | |
| Saltpond ... ... ... ... | — | 1 | — | — | — | — | 8 | 4 | 8 | 4 | 1 | 1 (M.O.) | |
| Winneba ... ... ... ... | 1 | 1 | 4 | 1 | 7 | 1 | 28 | 22+6 cots | 32 | 28+5 cots | 1 | 1 (M.O.) | |
| Total ... ... ... | 2 | 5 | 6 | 1 | 10 | 1 | 82 | 54+6 | 100+2 | 66+12 | 7 | 7 | |

## APPENDIX I—*contd.*

### GOVERNMENT HOSPITAL BED ACCOMMODATION AND DISPENSARIES, GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH SPHERE OF TOGOLAND, MEDICAL BRANCH.

| COLONY. | HOSPITAL. | | EUROPEAN. | | | | AFRICAN. | | | | Dispensaries. | Medical staff (medical officers and women medical officers). | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WESTERN PROVINCE. | European. | African. | Total beds at present. | | Number of beds possible. | | Total beds at present. | | Number of beds possible. | | | | |
| | | | M. | F. | M. | F. | M. | F. | M. | F. | | | |
| Axim ... ... ... ... ... | 1 | 1 | 3 | — | 6 | — | 12 | 4 | 12 | 4 | 1 | 1 (M.O.) | |
| Chama ... ... ... ... ... | — | — | — | — | — | — | — | — | — | — | — | 1 Red Cross sister. | Red Cross welfare centre. |
| Sekondi ... ... ... ... ... | — | 1 | — | — | — | — | 47+2 cots | 9+5 cots | 47+2 cots | 9+5 cots | 1 | 2 (M.O.s.) | |
| Sekondi ... ... ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | 1 Red Cross sister. | Red Cross welfare centre. |
| Takoradi ... ... ... ... | 1 | — | 19 | 3 | 20 | 3 | — | — | — | — | 1 | 1 (M.O.) | |
| Tarkwa ... ... ... ... ... | — | 1 | — | — | — | — | 7 | 4 | 7 | 4 | — | 1 (M.O.) | |
| Wiawso ... ... ... ... ... | — | 1 | — | — | — | — | 6 | 2 | 6 | 2 | 1 | 1 (M.O.) | Visited occasionally by M.O. |
| Total ... ... ... | 2 | 4 | 22 | 3 | 26 | 3 | 72+2 | 19+5 | 72+2 | 19+5 | 5 | 8 | |

## APPENDIX I—*contd.*

### Government Hospital Bed Accommodation and Dispensaries, Gold Coast Colony, Ashanti, Northern Territories and British Sphere of Togoland, Medical Branch.

| Ashanti. | Hospital. | | European. | | | | African. | | | | Dispensaries. | Medical staff (medical officers and women medical officers). | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | European. | African. | Total beds at present. | | Number of beds possible. | | Total beds at present. | | Number of beds possible. | | | | |
| | | | M. | F. | M. | F. | M. | F. | M. | F. | | | |
| Bekwai ... ... ... ... ... | — | 1 | — | — | — | — | 6 | 4 | 6 | 4 | 1 | 1 (M.O.) | |
| Kumasi ... ... ... ... ... | 1 | 1 | 10 | 1 | 10 | 1 | 111 | 26+5 cots | 111 | 26+5 cots | 1 | 4 (M.O.s.) | |
| Kumasi ... ... ... ... ... | — | 1 | — | — | — | — | — | 11+23 cots | — | 11+23 cots | 1 | 1 (W.M.O.) | Welfare centre. |
| Sunyani ... ... ... ... | — | 1 | — | — | — | — | 12 | 4+2 cots | 12 | 4+2 cots | 1 | 1 (M.O.) | |
| Total ... ... ... | 1 | 4 | 10 | 1 | 10 | 1 | 129 | 45+30 | 129 | 45+30 | 4 | 7 | |

## APPENDIX I—*contd.*

### GOVERNMENT HOSPITAL BED ACCOMMODATION AND DISPENSARIES, GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH SPHERE OF TOGOLAND, MEDICAL BRANCH.

| NORTHERN TERRITORIES. | HOSPITAL. | | EUROPEAN. | | | | AFRICAN. | | | | Dispensaries. | Medical staff (medical officers and women medical officers). | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | European. | African. | Total beds at present. | | Number of beds possible. | | Total beds at present. | | Number of beds possible. | | | | |
| | | | M. | F. | M. | F. | M. | F. | M. | F. | | | |
| Bawku ... ... ... ... ... | — | 1 | — | — | — | — | 6 | — | 6 | — | 1 | 1 (M.O.) | |
| Lawra ... ... ... ... ... | — | 1 | — | — | — | — | 12 | 4 | 12 | 4 | 1 | 1 (M.O.) | |
| Navrongo ... ... ... ... | — | 1 | — | — | — | — | 11 | 3 | 13 | 3 | 1 | 1 (M.O.) | |
| Salaga ... ... ... ... ... | — | 1 | — | — | — | — | 8 | 2 | 8 | 3 | 1 | 1 (M.O.) | |
| Tamale ... ... ... ... ... | 1 | 1 | 4 | 2 | 6 | 2 | 40+3 cots | 5+3 cots | 40+3 cots | 5+3 cots | 1 | 2 (M.O.s.) | |
| Wa ... ... ... ... ... | — | 1 | — | — | — | — | 12 | 4 | 13 | 5 | 1 | 1 (M.O.) | |
| Zuarungu ... ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | — | Visited from Navrongo. |
| Gambaga ... ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | — | Visited from Bawku. |
| Total ... ... ... | 1 | 6 | 4 | 2 | 6 | 2 | 89+3 | 18+3 | 92+3 | 20+3 | 8 | 7 | |

## APPENDIX I—*contd.*

### GOVERNMENT HOSPITAL BED ACCOMMODATION AND DISPENSARIES, GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH SPHERE OF TOGOLAND, MEDICAL BRANCH.

| BRITISH SPHERE OF TOGOLAND. | HOSPITAL. | | EUROPEAN. | | | | AFRICAN. | | | | Dispensaries. | Medical staff (medical officers and women medical officers). | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | European. | African. | Total beds at present. | | Number of beds possible. | | Total beds at present. | | Number of beds possible. | | | | |
| | | | M. | F. | M. | F. | M. | F. | M. | F. | | | |
| Ho ... ... ... ... ... | — | 1 | — | — | — | — | 12 | 5 | 14 | 5 | 1 | 1 (M.O.) | Visited occasionally by M.O. |
| Kete Krachi ... ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | 1 (M.O.) | |
| Yendi ... ... ... ... ... | — | 1 | — | — | — | — | 9 | 10 | 10 | 10 | 1 | 1 (M.O.) | |
| Total ... ... ... | — | 2 | — | — | — | — | 21 | 15 | 24 | 15 | 3 | 3 | |
| Grand Total ... ... | 7 | 32 | 57 | 10 | 67 | 10 | 672+12 cots | 290+109 cots | 687+14 cots | 290+106 cots | 40 | 50 | |

*The number of beds possible is a variable figure. It can in case of outbreak be largely increased.

## APPENDIX I—*contd.*

### GOVERNMENT HOSPITAL BED ACCOMMODATION AND DISPENSARIES, GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH SPHERE OF TOGOLAND, HEALTH BRANCH.

| COLONY. CONTAGIOUS DISEASES HOSPITAL. | HOSPITAL. | | EUROPEAN. | | | | AFRICAN. | | | | Dispen-saries. | Medical staff (medical officers and women medical officers). | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Euro-pean. | Afri-can. | Total beds at present. | | Number of beds possible. | | Total beds at present. | | Number of beds possible. | | | | |
| | | | M. | F. | M. | F. | M. | F. | M. | F. | | | |
| Accra (Labadi) ... ... ... | 1 | 1 | — | — | 4 | — | 35 | 21 | 60 | 82 | — | 1 (M.O.H.) | Visiting. |
| Ada ... ... ... ... ... | — | 1 | — | — | — | — | — | — | 4 | 2 | — | 1 (M.O.H.) | Visiting. |
| Cape Coast ... ... ... ... | — | 1 | — | — | — | — | 5 | 4 | 13 | 13 | — | 1 (M.O.H.) | Visiting. |
| Keta ... ... ... ... ... | — | 1 | — | — | — | — | — | — | 4 | 2 | — | 1 (M.O.H.) | Visiting. |
| Koforidua ... ... ... ... | — | — | — | — | — | — | — | — | — | — | — | — | |
| Kumasi ... ... ... ... ... | — | 1 | — | — | — | — | 18 | 6 | 60 | 8 | — | 1 (M.O.H.) | Visiting. |
| Saltpond ... ... ... ... | — | 1 | — | — | — | — | 2 | — | 4 | — | — | 1 (M.O.H.) | Visiting. |
| Sekondi ... ... ... ... ... | — | 1 | — | — | — | — | 17 | 11 | 24 | 24 | — | 1 (M.O.H.) | Visiting. |
| Tarkwa ... ... ... ... ... | — | 1 | — | — | — | — | — | — | 6 | — | — | 1 (M.O.H.) | Visiting. |
| Winneba ... ... ... ... | — | 1 | — | — | — | — | — | — | 2 | 2 | — | 1 (M.O.H.) | Visiting. |
| Total ... ... ... | 1 | 9 | — | — | 4 | — | 77 | 42 | 177 | 133 | — | 9 | |

## APPENDIX II.

### Annual Report on Leper Settlement, Ho.

*Staff.*—The staff of the settlement comprised a medical officer, African superintendent, head dresser and one female and three male assistant dressers. Except for the first two officers, all the staff are lepers and have been trained in the settlement. Three labourers are employed to assist in the sanitation of the area.

*Inmates.*—At the end of 1934, 351 lepers remained in the settlement. During the year 105 were admitted—this figure included re-admissions—and 140 were discharged or were allowed to leave. Eight patients died leaving a total of 308 at the end of the year 1935.

The table given below shows the country of origin of the lepers admitted since 1928.

| | |
|---|---|
| Cameroons ... ... ... ... ... ... ... | 1 |
| Gold Coast Colony ... ... ... ... ... | 203 |
| Kroo Coast ... ... ... ... ... ... | 4 |
| Nigeria ... ... ... ... ... ... ... | 3 |
| Northern Territories of Gold Coast ... ... ... | 13 |
| Syria ... ... ... ... ... ... ... | 1 |
| Togoland under British Mandate ... ... ... | 559 |
| Togoland under French Mandate ... ... ... | 21 |
| Total ... ... ... ... ... | 805 |

*Treatment.*—Instead of using Moogrol, hydnocarpus oil and Alepol, experiments were carried out with injections of Bonney's Blue, and a 1 per cent aqueous solution of methylene blue for the cutaneous cases. The criterion for judging the results was (1) the clinical improvement observed, and (2) the bacteriological changes, as shown by the number of bacilli per field and any alteration in the staining reactions or morphological changes in the bacillus itself. These dyes were used on the assumption that, with intramuscular injection, they were absorbed by the reticulo-endothelial cells and so have a germicidial action on the bacillus in vivo. The results were very disappointing, only two cases showing " clinical " improvement. No cases showed " bacteriological " improvement. One of these cases was a Syrian. It is of interest to note that, according to reports from Saigon, only the lighter skinned people showed improvement with methylene blue medication. This rather suggests that the drug has a photo-dynamic action. The other patient was an old case who had shown definite curves in his condition. When the treatment was started he was probably on the up grade.

As these drugs have proved unsatisfactory, it is proposed to use intradermal iodised esters for these cases in future.

The nerve cases still receive weekly injections of either Moogrol, hydnocarpus oil and Alepol. From my own observations Alepol appears to give the best clinical results, but it is very unpopular with the patients.

Leprotic eye conditions receive a course of injections with Solgonol B.

The results of treatment can be summarised as follows :—

Arrested 59, improved 114, slightly improved 4, stationary 75, worse 54, died 8.

*Occupational therapy.*—Able-bodied lepers worked on their own farms and at carpentry, mat and shoe-making. They also assisted in the reconstruction of the settlement after the disastrous fire.

*Subsistence.*—An allowance of 2s. was paid every sixteen days in respect of children under 10 years of age who live with their parents or guardians. An allowance of 3s. was paid to able-bodied lepers who were able to work on their farms or possessed some other way of earning their living. Semi-disabled lepers who did special work for the settlement received 4s. and totally disabled lepers and leper school teachers were given an allowance of 6s. for the sixteen-day period. The allowance for those able to work was purposely reduced during the year in order to encourage patients to do some work and thus have less time to think about their complaint.

*Education.*—Five leper school masters assisted to conduct schools which both children and adults attended. Writing materials, books, etc., are supplied from time to time by the Gold Coast Branch of the British Red Cross Society. Weekly services were held in the Ewe Presbyterian Church and in the Roman Catholic Church in the settlement.

*Buildings.*—Reference has been made to the serious fire. Over eight out of eleven compound houses forming the settlement were totally destroyed by fire in January, 1935. New compounds were erected during the year to replace these, corrugated iron sheets being used for the roofs instead of the inflammable grass. During the reconstruction of the settlement, the inmates were housed in temporary grass huts and in the churches and dressing sheds.

*Sanitation.*—The general sanitary state remained satisfactory during the year. Pan latrines and field incinerators were used for the disposal of waste. The water supply again gave cause for anxiety, since both the small streams and an adjacent well dried up during the height of the dry season. As soon as funds become available, it is very desirable that the pipe supply for Ho township should be extended to the settlement where water could be delivered into locked tanks situated in each compound.

H. C. ARMSTRONG,
*Medical Officer.*

## APPENDIX III.

### Report on two cases of Gas Poisoning seen at Bekwai Hospital.

CASE I.—19–9–35.

A young adult African male was admitted to the wards at 12.30 p.m. from Obuom Mines.

*History.*—The boy had been working removing " rubble " after underground blasting. The rubble was soft and he stated afterwards that when he put his bar in some " smoke " came out and he slept.

*Condition on admission.*—The patient was not totally unconscious, but required strong stimulus to elicit any response, e.g. yelling, and he would open his eyes. His pulse was good, full and bounding, rate 70. Respirations were very spastic in nature (gasping). The arms and legs were in spasm, half-flexed and moving with spastic movements in time with the spasms of the respirations. His back was arched in a position of slight opisthotonus.

*Treatment.*—An injection of morphia $\frac{1}{4}$ and hyocine hydrobrom. gr. 1/150 was given subcutaneously. After about half an hour the spasm passed off. Then bromide was given by mouth. Next day the patient was put on mist. quinine, thrice daily. A course of bismuth sodium tartrate was given for yaws feet during his convalescence. He was discharged to resume duty on 30–9–35.

*Diagnosis.*—Gas poisoning from dynamite fumes. The Inspector of Mines after investigation recorded a similar finding.

CASE II.—24–9–35.

A young adult African male was admitted to the wards at about midnight with a history of having been gassed, while working in the mine after blasting operations, but near some oil-burning machinery.

*Condition on admission.*—The patient was comatose, there were no visible respirations, his pulse was only obtainable with stethoscope over the apex. His temperature was sub-normal. No signs of external injury were noted.

*Treatment.*—An injection of 1 cc of adrenalin was given and artificial respiration was commenced 12.05 a.m. and continued till 1.20 a.m. when natural respirations returned. The patient was treated for shock. Later a quinine mixture was given and the patient made an uninterrupted recovery. He was discharged on 7–10–35. The diagnosis was carbon monoxide poisoning.

After investigation the Inspector of Mines recorded the finding that dynamite fumes were the cause. There was no chance of the machinery being responsible but " dynamite fumes " are very complex and contain carbon monoxide, nitrous oxide and carbon dioxide among other gases.

The interest is the very different clinical features presented by the two cases, although the cause was the same in both.

J. W. DENOON,
*M.O. Bekwai.*

## APPENDIX IV.

## Report of the Committee on Human Trypanosomiasis.

1. *Appointment of Committee.*—The Committee was appointed by His Excellency the Governor to discuss the problem created by the apparent increase in prevalence of the disease known as human trypanosomiasis.

2. *Members of the Committee.*—The members of the Committee were :—

His Honour the Chief Commissioner of Ashanti (Chairman).
His Honour the Chief Commissioner of the Northern Territories.
The Honourable the Director of Medical Services.
The Honourable the Secretary for Native Affairs.
The Acting Principal Veterinary Officer.
The Deputy Director of Health Service.
The Senior Pathologist.

3. *Witnesses.*—In addition, the following witnesses were called to give evidence before the Committee :—

The Acting Director of Agriculture.
The Acting Conservator of Forests.
Dr. G. H. Gallagher, Assistant Director of Medical Services.
Dr. G. F. T. Saunders, Medical Officer.

4. *Time and place of Meeting.*—The Committee met on the 2nd and 3rd July, 1935, in the office of His Honour the Chief Commissioner of Ashanti, Kumasi.

5. *Terms of Reference.*—The terms of reference were :—

(*a*) to advise as to the best means of combating human trypanosomiasis ; and
(*b*) to consider the existing legislation on the subject and to advise whether any revision is necessary.

The Committee was also asked to record its opinion as to the practicability of the draft regulations under the Infectious Diseases Ordinance. A copy of these regulations is annexed as *Appendix A to this report.

6. *Formation of Sub-Committee.*—In view of the fact that the problems to be faced in the Northern Territories and in Ashanti differed widely in their nature, it was felt that it would be wise to appoint sub-committees in each administration, to make preliminary investigations and to collect whatever data were locally available.

These sub-committees were in due course convened and reports prepared by them were later considered in detail at the meetings of the main Committee. These reports, which deal with various controversial matters are annexed to the present report as *Appendices B and C.

7. *Form of Report.*—It has been thought convenient to divide the remainder of this report into three parts. Part I consists of general observations on the nature of the problem with which the Committee has had to deal, together with the more general of the recommendations put forward. Part II sets out a scheme of preventive work which it is hoped will be undertaken forthwith in the Northern Territories ; and Part III outlines a similar scheme for eventual application in Ashanti.

## PART I.

## GENERAL OBSERVATIONS.

8. *Paucity of Data.*—At certain stages of its discussion the Committee found itself handicapped by a lack of authoritative data. It hesitates, for instance, to recommend defensive action against *G. longipalpis* until it is satisfied that this fly constitutes a real menace to humans. Similarly it is felt that the effect of the presence of cattle on the concentration and breeding of tsetse fly should be more accurately determined before large expenditure on the clearing of these cattle routes which pass through heavy forest country can be contemplated. These points, together with certain others mentioned later in this report, should be examined and, where possible, elucidated by experts in the fields concerned.

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*Omitted for the sake of brevity.

9. *General Situation.*—The Committee does not consider that the present situation throughout the Colony need give rise to undue concern. The disease is undoubtedly a drain upon the people and can, in certain circumstances, become dangerous ,but there is, on the whole, no cause for panic.

10. *Apparent Increase in Prevalence.*—Hospital figures show a relatively considerable increase in the number of cases of trypanosomiasis treated by the medical officers of the Colony during recent years. This increase, however, does not necessarily mean that there has been a serious increase in the incidence of the disease among the people of the Gold Coast. The figures available should be interpreted with much caution. There have certainly been isolated outbreaks in a few areas (such as Mamprusi) but it would be a mistake to suppose that a corresponding increase throughout the Colony is thereby indicated.

11. *Explanation of Apparent Increase.*—There are various factors which tend to explain the rise in the number of cases observed or reported. Since 1924 the medical officers have become more aware of and interested in the disease. Diagnosis is now more accurate and more efficient means of treatment are available. This has in turn engendered a feeling of confidence among the natives. The more cases a medical officer cures, the more cases he is given an opportunity of treating. The Africans, impressed by the good results already obtained, are coming forward in greater numbers to the various hospitals. The success of the treatment camp at Nakpanduri, for instance, may be attributed in large measure to the enormous increase of confidence in European medicine.

12. *Change in Native Attitude Towards Disease.*—Along with this new confidence in the effectiveness of the treatment offered has come a pronounced diminution of the old idea that trypanosomiasis is a disease which brings shame upon those afflicted. There is evidence to show that the former widespread practice of separate burial for victims of trypanosomiasis is now dying out. Moreover, the Native Authorities are themselves growing aware of their responsibilities in this matter.

13. *Need for Intensive Propaganda.*—Nevertheless, native ignorance of the true nature of the disease remains one of the greatest obstacles in the way of progress. Superstitious and semi-religious accounts of the origin of trypanosomiasis and of the process by which an individual may be infected, still abound. The need for gradual enlightenment of the African by means of persistent (although not blatant) propaganda cannot be too strongly emphasised.

14. *Estimate of Actual Rate of Increase.*—In spite of the foregoing remarks, it is probable that there has, in recent years, been a slight increase in the prevalence of the disease. The opening up of communications, which has led to more speedy movements of the population and the introduction thereby of infected people into other areas, is naturally a factor making strongly for such an increase. A wide survey repeated from time to time would give data to answer this question.

15. *Incidence of Disease—Northern Territories.*—The incidence of trypanosomiasis in the most seriously infected focus, which lies in the Northern Territories, varies between 4 and 10 per cent. 7 per cent may be taken as an average for the area. This is, of course, a figure which gives rise to anxiety.

16. *Incidence of Disease—Ashanti.*—The rate of infection is not so high in Ashanti as in the Northern Territories, and it has been established that the majority of cases treated in Ashanti hospitals are immigrants from the north. However, the Ashanti themselves are by no means immune to the disease and numbers of them have been infected. The percentage of infection in northern Ashanti is about ·6. The problem in Ashanti is therefore fortunately less acute than in the Northern Territories but on the other hand it will be shown in a later paragraph that the measures necessary for prevention will be far more expensive.

17. *Object of Report.*—The main object of this report is to focus attention on the problem of human trypanosomiasis in order that steps may be taken to prevent where possible, the extension of the disease. It is important that the whole Colony should be made the subject of a special survey, but it must be remembered that the statistics so obtained will be useless for purposes of immediate comparison with figures already available, although they will certainly be of great value for comparison with similar statistics which may be furnished by similar surveys to be undertaken in the future.

18. *The Immediate Problem.*—The immediate problem is how best to apply our present knowledge to our present circumstances so as to limit wherever possible contact between fly and human, especially in places where such contact is, at the present time, actually doing noticeable damage—as, for instance, in the Gambaga and Tumu areas—or in places where damage may be done in the future. In other words, a determined attempt should be made to control conditions which are known to be favourable to an increase in the incidence of the disease. Heavily infected foci should receive prompt attention and it is in these areas that preventive work on a large scale should first be undertaken. A steady campaign, however, should be conducted everywhere.

19. *Varieties of Tsetse Fly.*—In the Northern Territories the usual vector of trypanosomiasis is the *G. palpalis,* although *G. tachinoides* is also quite common. These two species of fly flourish in similar conditions and the methods of dealing with them are similar. In the forest zone (Ashanti) *palpalis* is again the chief menance, although there is to be found, in the scrub which springs up as a result of shifting cultivation and the felling of high trees by the mines, a third variety known as *G. longipalpis.* The presence of this fly gives rise to a separate and distinct problem, which, although of small significance at the present time, may prove embarrassing in the future, The Committee has made certain recommendations with regard to this problem and these are set out in a later paragraph of the report.

20. *Success of Defensive Clearing.*—In spite of some disappointment in certain areas, the defensive clearings already undertaken have been satisfactory, and the Committee is agreed that this is the best method of dealing with both *palpalis* and *tachinoides.* Clearing is, indeed, more important than treatment, although effective treatment has a high preventive value. The danger of creating arsenic-fast trypanosomes has lately been emphasised by the medical authorities. In certain of the French West African territories a policy of treatment on a most ambitious scale has been adopted, and much success has been claimed for this method. In the opinion of the Committee both preventive and curative measures should be employed in this country, but the promptest and most effective results are likely to be derived from well-planned and carefully maintained clearings.

21. *Method of Clearing.*—Action in respect of proposed clearings should be guided by the principles laid down by Saunders and Morris in their paper already published in the *West African Medical Journal* and circulated to all stations. A copy of this paper is annexed as Appendix D to the present report. Further useful advice is to be found in Dr. Nash's paper on clearings, which has been similarly circulated.

22. *Legislation.*—The general feeling among those political officers who have been consulted on this subject is that coercive legislation should, if possible, be avoided, and that it would be wiser to aim at securing the support of Native Authorities and at convincing them, by propaganda, of the importance and urgency of the suggested preventive work. With these sentiments the Committee is unanimously in agreement, although it is realised that, should the attempt to control the disease by regulation through the native authorities fail, direct action must be taken. The present opinion of the Committee is that existing legislation, if wisely implemented, provides adequate means of ensuring that the proposed work of clearing will be carried out. The whole position with regard to legislation should, however, be reconsidered at the end of a trial period of two years.

23. *An Exception.*—There is one small exception to the general principle outlined in the previous paragraph. The Committee has decided to recommend that a rule be made stipulating the amount of clearing to be carried out round water-supplies in the Northern Territories and Ashanti. This rule, a draft of which will be found in paragraph 36 below, is intended to be enforced in special cases only (*vide* paragraph 37 below).

24. *Importance of completion of Treatment.*—Dr. G. F. T. Saunders, medical officer, who gave evidence before the Committee, pointed out that it was desirable that natives who had voluntarily applied for treatment should be compelled to remain under medical supervision until that treatment was completed. In any centre where a hospital or treatment camp has been established, the local native authority should be urged to make a rule to this effect.

25. *Migration of Labour.*—The sub-committee for Ashanti, in its report, suggested that a strict control of the movement of labour might help to reduce the incidence of the disease. The Committee, while agreeing that a large number

of the labourers entering Ashanti from the Northern Territories are undoubtedly infected, is unable to envisage any system of regulation which could reasonably be expected to succeed. A chain of quarantine stations, at intervals of fifteen miles, would be needed, and even then evasion would be a simple matter. There is also the important consideration that any such scheme of control might interfere with the free flow of labour towards the mines, which are likely to make increasingly heavy demands upon the Northern Territories as a source of supply. The scheme is also rendered impracticable by the enormous expenditure which would be involved. Labourers rejected as unfit at the Ashanti border would presumably have to be subsisted by Government until such time as they were safely returned to their homes. The Director of Medical Services has promised to send a pathologist to the Northern Territories at an early date to conduct an investigation with a view to discovering what percentage of immigrants are actually infected. When these new figures are available the question of control of migration can be reconsidered.

26. *Cattle.*—The Committee is unable, from the data before it, to come to any decision as to the effect of the presence of cattle on the incidence of the disease. There is evidence to show that *G. palpalis* has a partiality for human blood, but on the other hand it is easier for the fly to bite cattle and large numbers of *G. palpalis* undoubtedly follow the herds down from village to village, thus increasing fly concentration. Dr. Saunders believes that in areas where an abundant blood food-supply is not already available, the advent of cattle probably tends to encourage breeding of the fly. Whether the presence of cattle does in effect increase fly to such an extent as to be dangerous to humans is a question which an entomologist should be invited to answer.

27. *Slaughtering of Cattle.*—The scheme, outlined in the report of the Ashanti sub-committee, for the killing of cattle in the Northern Territories and the storing of meat in specially constructed frigidaires, is held to be impracticable. Moreover, any measures which would tend to decrease the number of cattle in the Colony are undesirable, as the policy of the Medical Department is to encourage the inclusion of a larger proportion of meat-foods in the average native diet.

28. *Deflection of Cattle Routes.*—The Committee is not in favour of the complete deflection of the cattle routes, since any such action would be nullified sooner or later by a corresponding spontaneous deflection of human routes. For the purposes of preventive work cattle and human beings must be considered together, as it is clear that no attempt to segregate them would meet with more than partial and temporary success. It might be advisable for certain deflections to be made in order to prevent the cattle passing through the larger villages, but the more effective method of dealing with the general problem would be to make extensive clearings along the existing routes. In view of the considerable amount of revenue derived annually from the cattle tax, the Committee feels that the cost of this work of clearance would be a fair charge upon Government.

## PART II.

## THE NORTHERN TERRITORIES: RECOMMENDATIONS.

29. *Work in the Northern Territories.*—The Committee came early to the conclusion that it was not possible to treat the Northern Territories and Ashanti as one, owing to the different nature of the bush which is to be found within the two administrations. The problem in the Northern Territories is easier of solution than that in Ashanti, owing to the absence of large belts of heavy forest. Moreover, it must be borne in mind that the gravest foci of infection all lie within the Northern Territories. There are therefore reasons stronger than that of mere convenience for suggesting that the preventive measures recommended by the Committee should first be carried into effect in the northern areas.

30. *Clearing.*—Present action at all ferries, fords, crossings and water-holes in the Northern Territories should be intensified. Clearing work in certain areas has in the past suffered from the lack of competent supervision and it is felt that communal labour, although it could legally be employed, would be unlikely to reach the desired degree of efficiency. The Committee therefore recommends the use of trained and paid labour, supplemented where possible by communal labour.

31. *Operation of Paid Gangs.*—The Committee suggests that six paid gangs of twenty men each, under six experienced supervisors, should operate in important

areas as an example to the people. The Principal Veterinary Officer has offered to make arrangements for the training of the required number of supervisors at Pong-Tamale.

32. *Maintenance of Clearings.*—Once the initial clearing has been accomplished the work should be carried on by the local population. Each area affected should be re-cleared at least twice a year.

33. *Selection and Clearing of Infected Areas.*—A mobile unit or team of experts including one medical officer and one entomologist, should travel from place to place and make recommendations as to areas where clearing is desirable. These recommendations should then be carried into effect by the political officer in charge of the district, working in close collaboration with the local medical officer. It is considered essential that the local work should be carried out under the supervision of the local officers, who are known to the people. Where necessary, an assistant district commissioner should be posted to a district in which clearing work is to be undertaken. The substantive officer will thus be relieved of his routine duties and will be able to devote his whole energies to the carrying out of the suggested preventive measures.

34. *Itinerary of Travelling Commission.*—It is assumed that the expert unit advising on preventive work will commence its activities in the north-east corner of the Northern Territories and afterwards move towards Tumu and Lawra.

35. *Tools.*—Proper tools for clearing should be supplied by Government to the native authorities within whose jurisdiction work of this nature is being undertaken.

36. *Clearing of Water-holes.*—The following rule calling for clearing to a distance of 50 yards round all water-holes was approved by the Committee :—

> " Within a radius of at least 50 yards of any water-hole or water-course from which water is habitually drawn for domestic purposes, or which is used habitually for the purpose of watering live-stock, or at which human beings habitually bathe or wash clothes, all vegetation, except tall trees with high crowns and low-growing crops such as groundnuts and beans, shall be completely removed.
>
> " No farming of the cleared area by planting corn, cassada or other tall-growing crop shall on any account be permitted."

The area thus affected at each water-hole would be approximately two acres.

37. *Application of Rule.*—The above rule is in addition to the existing rules relating to clearing round villages. It is to be applied by the Administration, on the advice of the medical authorities, in some areas which, after adequate investigation, have been shown to be infected. The rule is intended to apply to both the Northern Territories and Ashanti.

38. *Importance of Preventive Measures.*—The immediate and local problems, especially in badly infected areas, are to be regarded as urgent, and the proposed wider survey should run concurrently with the preventive work outlined above, which need not await the publication of a general report.

39. *Danger of Erosion.*—In the Northern Territories water supply is scanty and clearing round holes might well result in the supply being silted up or destroyed, since the removal of the surrounding bush will inevitably encourage evaporation and erosion. Care must be exercised to mitigate this tendency.

40. *Prevention of Erosion.*—High shade should be left standing round water-holes and farming of the cleared area with low-growing crops, such as beans and groundnuts, should always be undertaken.

41. *Establishment of Treatment Camps.*—The Committee feels that, in order to win the confidence and active co-operation of the people, some amount of treatment should be offered them, in return for the work they are expected to do on clearing projects, etc. To maintain interest in the general campaign against the disease, treatment camps should be established in the badly infected areas. These camps should be built by the people themselves, but funds should be provided by Government to supplement native expenditure, if required.

## PART III.

## ASHANTI : RECOMMENDATIONS.

42. *High Cost of Clearing in Ashanti.*—The problem of clearing in Ashanti presents unusual difficulties. Water-supplies are abundant (there are, for example,

six at Nkoranza) and to clear them all would require a formidable amount of work. Moreover, clearing on the generous scale contemplated by the rule quoted in paragraph 36 above is likely to involve Government in prohibitive expenditure, for, whereas the cost of clearing per acre in the Northern Territories is not more than £5 (including cutting, piling and burning), in Ashanti it is estimated to be as high as £16. The Committee does not therefore anticipate that its recommendations with regard to Ashanti will be translated into action in their entirety.

43. *Cocoa Trees.*—Some doubt exists as to whether cocoa trees may be described as " high " or " low " shade. The chairman of the Committee is unwilling to see vast numbers of them indiscriminately felled in Ashanti. It is suggested that experiments with special traps should be undertaken to determine whether cocoa trees actually harbour tsetse fly. Should these experiments reveal that a cocoa tree is " low " shade, favourable to fly, Government will be confronted with the grave additional problem of compensation. The value of the average cocoa tree varies between 1s. 6d. and 2s. Clearing round a single water-hole, on the scale proposed by the Committee, might easily result in the loss of three or four hundred trees. The cost of clearing in Ashanti, already five times as high as in the Northern Territories, would thus be almost exactly doubled.

44. *Recommendations as to Clearing in Ashanti.*—After taking into consideration the immense difficulties involved, the Committee nevertheless recommends, as an acknowledged counsel of perfection, that the work of clearing which is to be undertaken in the Northern Territories should be extended to the villages of northern Ashanti, where paid gangs should operate, assisted by communal labour. Action over a wider area should be deferred until an expert survey of Ashanti has thrown further light on the extent to which the various districts are infected.

45. *G. Longipalpis in Ashanti.*—Owing to the practice by the natives of " shifting cultivation " and to the cutting of firewood in large quantities for use in the mines, areas of short scrub are developing in various districts of Ashanti. This short scrub affords excellent shelter to *G. longipalpis.* The Acting Director of Agriculture, giving evidence before the Committee, stated that the problem of shifting cultivation should not be regarded as insoluble. Success has already attended the introduction of green manuring in Nigeria, and similar action in this Colony may do much to diminish this undoubted menace. The Committee is of the opinion that this potentially serious aspect of the general problem of trypanosomiasis should be more closely investigated and trusts that the Departments of Forestry and Agriculture will continue to focus expert attention on the two subsidiary problems involved.

46. *Clearing of the Cattle Route in Ashanti.*—It is recommended that the clearing of the cattle route should be undertaken at once in the Northern Territories, where the problem is less difficult, and that the larger crossings in Ashanti should also be cleared. Clearing on the scale adopted for the Northern Territories might be continued as far as Ejura, but before the work is extended below that point an entomologist should be asked to advise whether the degree of infestation at the remaining crossings justifies further expenditure. The entomologist should also advise as to the exact distance to be cleared at each crossing. In making this guarded recommendation with regard to Ashanti the Committee has been influenced by the knowledge that a ruthless clearance of the cattle route below Ejura would be a costly undertaking and would moreover demand the removal of a large number of cocoa trees.

47. *Clearing at Ferries.*—The Committee recommends that the owners or lessees of important ferries should, if possible, be made responsible for the work of clearing at those ferries. Clearing at the smaller ferries should where possible be undertaken by the relevant native authorities.

48. *Summary—General Observations :—*

(i) The situation in the Colony as a whole is not so serious as to warrant undue concern.

(ii) The increase in cases treated is largely the result of increased confidence in European medicine, increased awareness of the disease among medical officers, and the gradual breakdown of native ignorance and superstition.

(iii) The problem in Ashanti is less urgent than in the Northern Territories but combative measures will be more difficult.

49. *Summary—Recommendations* :—

(i) A general survey of the Northern Territories, Ashanti and the Colony (in that order) should be undertaken, to locate infected areas and to determine the incidence of the disease.

(ii) Intensive preventive and curative work in areas which are known to be foci of infection should continue in the meantime.

(iii) Work should be begun at once in the Northern Territories along the following lines:—

- (*a*) Paid clearing gangs should operate in certain areas; clearings should afterwards be maintained by the native authorities.
- (*b*) Treatment camps should be established in the badly infected zones.
- (*c*) The cattle route should be cleared as far as Ejura.
- (*d*) The rule suggested in paragraph 36 should be applied where necessary, both in the Northern Territories and in Ashanti.

(iv) Similar work should be undertaken in the infected areas in northern Ashanti.

(v) The remainder of Ashanti should be the subject of a survey, which would determine the incidence of infection.

(vi) The larger crossings on cattle routes in Ashanti should be cleared; an entomologist should be asked to make recommendations as to further clearings.

(vii) Water supplies in Ashanti should be cleared in areas proved to be infected.

(viii) The activities of *G. longipalpis* should be investigated, together with the problem of controlling shifting cultivation and the indiscriminate cutting of forest by the mining companies.

(ix) The question of the regulation of immigrant labour should be reconsidered after a pathologist has reported on the extent of infection among such labour.

(x) An entomologist should be asked to report on the effect of the presence and/or migration of cattle on the breeding and concentration of tsetse fly.

50. *Terms of Reference—Combating of Human Trypanosomiasis.*—Human trypanosomiasis can best be combated by preventive measures of the kind outlined in this report, supplemented where practicable by treatment of infected cases.

51. *Terms of Reference—Legislation.*—Existing legislation is adequate, but the possibility of framing new regulations should be considered in two years' time, if the proposed attempt to control the disease by regulation through the native authorities has by then failed.

52. *Opinion as to Draft Regulations under the Infectious Diseases Ordinance.*—This is not an opportune moment for coercive legislation of this nature. The present aim of Government should rather be to secure the co-operation of the chiefs and people by means of propaganda and example through the various available channels political officers, Veterinary, Medical, Forestry and Agriculture Departments, schools, missions, etc.).

F. W. F. JACKSON,
*Chief Commissioner of Ashanti,*
(*Chairman*).

W. J. A. JONES,
*Chief Commissioner of the Northern Territories.*

D. DUFF,
*Director of Medical Services.*

HUGH THOMAS,
*Secretary for Native Affairs.*

W. C. L. ORR,
*Acting Principal Veterinary Officer.*

P. S. SELWYN-CLARKE,
*Deputy Director of Health Service.*

GEORGE ROBINSON,
*Senior Pathologist.*

# APPENDIX D TO REPORT OF THE COMMITTEE ON HUMAN TRYPANOSOMIASIS.

## Suggestions for the Control of Human Trypanosomiasis

by

G. SAUNDERS, M.D., AND K. S. MORRIS, B.SC.

1. The question of estimating the importance of trypanosomiasis and of suggesting measures for its control, if necessary, involve considerations which extend far beyond the boundaries of a technical discussion of entomological and pathological factors ; both the general sanitary policy and administrative, economic and social factors must be taken into account. We would, therefore, very strongly deprecate any attempt at procrustean policy. Any recommendation which we may be able to make on the subject should be put into operation in any given district only after due consultation with an officer who has a long and intimate local knowledge, and with such other technical experts as may be necessary and available.

2. We are not of the opinion that trypanosomiasis in the Gold Coast constitutes a serious or immediate danger to the stability or economic condition of the people. Even if we carry out the illegitimate procedure of adding together the two Makongo surveys we get a percentage infection of only about 11 per cent. The infected areas in the Kamerun vary from 38 per cent to 78 per cent (Jamot, 1925), reaching 80 per cent in some riverside villages.

We are, however, of the opinion that trypanosomiasis constitutes a continual drain of death and ill-health ; and also that there is a potential danger of extension, if the development of the country were to progress in such a way as to expose large numbers of people to the fly. We consider that the incident of the infection of our fly-boys proves this latter view.

3. Since it is obviously impossible to carry out a careful entomological survey of every village in the Gold Coast, our first consideration in the matter of control was to enunciate a formula which could be enforced by sanitary or political authorities without specialist entomological advice.

The " Rules for the guidance of Chiefs and Headmen in Ashanti " lay down that a clearing of 50 yards be maintained round each village ; that the main entrance to the village be cleared to a width of 15 feet, and that the ground adjoining the water supply be cleared, no distance being specified in this latter case. (Smith, 1928, p.45).

The rules for the Northern Territories contain the same clauses but specify 30 yards as the distance to be cleared on the banks of streams near the water supply. (Smith, 1928, pp. 265, 268).

From the point of view of general sanitation such rules have undoubted value. The clearings will prevent defaecation close to houses or water-holes and by allowing the more complete drying of the ground in wet weather will abolish many breeding-places of houses flies and mosquitoes.

4. When, however, we come to the consideration of a fixed set of rules as combative measures against the spread of trypanosomiasis we at once find ourselves faced with several difficulties ; the first and greatest being the fact that there are several species of *Glossina* of widely different habits which are potential vectors of the disease in this country. In the Ashanti forest we find G. *Palpalis* along all the water-courses and occupying the regrown vegetation in clearings and deserted farms. In the secondary bush that surrounds the true forest we find *G. longipalpis* showing a practically homogeneous distribution with no relation to water-courses. In the savannah country of the north we find *G. palpalis* and *G. tachinoides* confined strictly to rivers and streams, and in a few places *G. morsitans* and *G. submorsitans* distributed evenly through the bush. (The carrier is discussed in our article on " Distribution " submitted to the *W.A.M.J.*).

It is obvious then that measures capable of effective application over a wide area of country will, of necessity, be found a little excessive in certain localised areas. This, however, will be both justified by and compensated by the fact we have emphasied above, that such a set of rules will dispense with the necessity for technical knowledge or advice.

5. With this consideration in view we feel that a certain modification of the existing rules would be amply justified in that it would bring about a very considerable increase in their efficiency. The modification we would suggest is an extension of the distance to be cleared along the banks of streams near the water

supply, from 30 yards, as specified in the rules for the Northern Territories, to 50 yards on each side of the water-hole, and the specification of this distance to be cleared around the water supply, in the rules for Ashanti.

The village water supply, where this is on a river or stream, has invariably been found the locality of the greatest concentration of tsetse, and here undoubtedly the greatest exchange of infection takes place. As far as experience in the Northern Territories goes, a 30-yard clearing at such place will have very little practical value in excluding tsetse ; the effect, if any, would scarcely justify the trouble of enforcing the law, e.g., at Makongo previous to clearing there was a perfectly open space approximately 30 yards across where the cattle route crossed the river ; at the edges of this clearing there was always a concentration of *G. palpalis* and *G. tachinoides*, which moved freely into the open to feed on people or cattle. At Nalerigu, close to Gambaga, there is a 40-yard clearing where the main road crosses a heavily *G. palpalis*-infested stream, and in January, at the driest time of the year when the harmattan was blowing and tsetse movement extremely limited, this species was caught in as great abundance at the road crossing, where people were washing, as in the uncleared bush along the river.

In view of the observations made at Takoradi, where there is a uniform distribution of *G. longipalpis* in thick bush, we are still more inclined to condemn small clearings. The places most favoured by the fly in this type of bush were small open glades and clearings 20 to 50 yards across ; and the conclusions reached from studying the effect of humidity on the fly is that the reason for the fly's presence in the open during the wet season is not so much its casual wandering in search of food but that it is driven out of the thick bush by the excessive humidity and seeks a more congenial atmosphere in the open spaces.

As this type of tsetse distribution extends throughout Ashanti, through the greater part of the Colony, and along the western side of the Northern Territories, we would strongly urge an increase in the size of the clearings stipulated if the laws are going to be enforced generally.

At Makongo, the standard of clearing was 100 yards on each side of every water-hole, and this produced complete exclusion of tsetse in the dry season. Sufficient wet season observations have not been made to estimate the efficiency throughout the year. But even if exclusion is maintained through a part of the year only, this is going to be a material benefit, if we may analogise the exclusion of tsetse from a village with the periodical evacuation of a village such as is practised by the Battau fishermen, and which apparently brings about considerable reduction in infection. Again complications are met with in the forest region, where the humidity is uniformly high through the year, so that the fly's movements are not limited during the dry season as in savannah country.

We are then strongly in favour of the standard of clearing being 100 yards on each side of the water-holes, but we realise that for economic reasons this may be found excessive, as throwing too great a burden on the native. A clearing extending 50 yards on each side of the water-hole is regarded as the minimum to be effective. A set distance must certainly be enunciated to enable political officers to enforce the rules.

6. Two riders could be added with advantage :—

I. The work of clearing should involve the complete removal of all vegetation. Such a clearing is not only far more effective in the exclusion of tsetse, but the regrowth of vegetation is hampered by the drying of the ground on the removal of all shade.

II. Farming of the cleared areas with low-growing crops should always be undertaken. Ground-nuts are by far the most suitable crop, as they can be grown on the same land for a number of years ; most other crops can only be grown for two or three years ; after which the ground becomes stale. Corn is unsuitable as it is inclined to encourage small game such as duiker, which in turn attract tsetse. Subsequent extension of the clearing by farming should always be aimed at, but the farmed areas should be as continuous as possible, as isolated farms of any nature in the bush are apt to attract game.

7. In our opinion ferries and all big river-road crossings should be cleared for at least a quarter of a mile on each side. This will not be so difficult as might be supposed, either in execution or in maintenance. Grass market huts could be erected close to the ferry crossing, which would enable women to sell produce and keep travellers waiting for the ferry from going along to the uncleared river.

8. From the results of studying certain clearings there seems the possibility of increasing the efficiency of riverside clearings tremendously by maintaining a vegetational barrier of dense low growth at each end of the clearing, cutting off the fly-belt from the open.

Both of these points certainly merit further investigation and trial. Even then it is possible that skilled advice would be necessary in each case before applying such modifications to ordinary clearings.

Such methods, employing paid labour under an entomologist's advice, would be justified at places such as large towns, where numbers of Europeans or Government employees are stationed.

9. In clearing round such towns in the forest, the subsequent draining of the ground, if it can be done, will be of value in that it will check the regrowth of the typical moisture-loving flora of the fly-belts, and may even inhibit altogether its re-establishment.

10. It is impossible to enunciate a standard distance for clearing such places of importance as are indicated in 7, 8 and 9 above, where the maximum exclusion of tsetse is desired, without an excessive amount of work. The factors governing the movements of the fly into the open, and hence the amount of clearing necessary, are so variable, depending on climate, vegetation, density of the fly-belt, migration of the fly, presence of attractive food, etc., that the individual study of each place by an entomologist would be justified if the work is to be of economic value.

11. One more point is worth mentioning : this is the danger of encouragin the presence of *Glossina*. Domestic animals, especially cattle, when continually in the proximity of a fly-belt or using a drinking hole on a fly-infested river, will not only bring about a concentration of tsetse, especially *G. palpalis* but, by ensuring an abundant and regular food supply, will definitely increase the breeding of the fly. Admittedly it is going to be extremely difficult to control this danger, but where such a state of affairs is of regular occurrence, such as is found all along the important towns, it will be necessary either to clear the fly-belts or to deflect the path of the animals, and to segregate human from animal water supplies or fly-infested streams.

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## Pan-African Health Conference, Johannesburg, 1935.

## YELLOW FEVER.

*Paper presented by Dr. P. S. Selwyn-Clarke, Gold Coast Delegate.*

1. It is proposed to touch upon some of the factors connected with the yellow fever problem with particular reference to its incidence in West Africa and the possibility of its spread to territories as yet unaffected.

2. A brief résumé might be made in the first instance of the past history of the disease.

3. A controversy has raged for many years as to whether yellow fever was carried to Central and South America and the West Indies by slave ships from West Africa.

4. Against this, is the possibility that the disease was known to the ancient Mexicans and that it existed in the New World in pre-Columbian times.

5. It has been known in Vera Cruz since 1509 and records of outbreaks are available affecting Spain and other European countries in the sixteenth and seventeenth centuries, infection having been carried by ships returning from the exploitation of Central and South America.

6. It will be recalled that the earlier attempts at European settlements in the Americas and Indies were seriously embarrassed by the ravages of the disease. Military units, merchants and missionaries alike suffered the penalty of their pioneering spirit.

7. Most investigators would probably admit that, from the evidence available, yellow fever must have been an indigenous disease in the New World. The almost continuous history of outbreaks certainly provides proof of its endemicity in those regions for many centuries.

8. In so far as West Africa is concerned, the contact between the white races and that part of the world dates back several hundred years ; some even aver that the West Coast was visited in the time of the Phoenicians.

9. Vantage points were undoubtedly established along the Coast in the fifteenth, sixteenth and seventeenth centuries, first by the Portuguese and later by the Dutch, Danes, English, French and Spaniards.

10. Colonisation, however, did not really commence until the eighteenth century and the earliest records of yellow fever in West Africa date from that epoch—the concentrations of whites serving as indicators of the presence of the disease.

11. The apparent later manifestation in West Africa is taken by some to connote an importation from the New World ; but it is far more likely that the disease has always been endemic in West Africa.

12. St. Louis in the French Senegal was the seat of the first authenticated outbreak in 1778.

13. Sierra Leone, a little further south, was long regarded as the home of the disease in so far as West Africa is concerned at any rate. Records are available from 1815 onwards of the existence in that settlement of a malady having all the signs and symptoms of yellow fever.

14. It might, perhaps, be of interest to give one or two examples of early outbreaks.

15. Reporting on the year 1824, Surgeon Ferguson of the then Royal African Corps stated that 786 cases of " fever " with 377 deaths had taken place—a mortality of nearly half the total strength of the military unit concerned.

16. In parenthesis, it might be noted that a difference of opinion existed at that time as to whether or not yellow fever was a contagious disease, the local medical authorities maintaining quite correctly that it was not.

17. In those days, it was frequently affirmed that infection was sea-borne. The old type of wooden sailing ship which provided many facilities for the sheltering and breeding of mosquitos and a human reservoir living under appalling conditions certainly made this practicable.

18. To quote one instance, *H.M.S. Bann* anchored off Freetown at a time when yellow fever was rife there. It subsequently sailed for Ascension Island, thirty-eight out of a crew of one hundred and thirty-eight dying of the disease, followed by seventeen deaths amongst the inhabitants of that small island.

19. A study of the almost unbroken series of outbreaks on the West Coast of Africa during the past century and a half suggests, however, that, whilst in certain instances, the infection may have been introduced by ships, it is far more likely that it was endemic in the territories in question.

20. Coming to the Gold Coast, there are grounds for belief that yellow fever was present from the beginning of the nineteenth century and possibly for a considerable period before then.

21. It is noteworthy that there was only one survivor in one hundred and twenty-eight white troops disembarked at Cape Coast in 1823 and seventy out of one hundred and nine women and children landed there in October of the same year died after a short period.

22. If old medical records in the Gold Coast are consulted, it is brought home rather forcibly that considerable reluctance existed in the old days to diagnose yellow fever. Patients having all the classical signs and symptoms are found to be described as cases of " African fever, typho-malarial fever, remittent fever, bilious remittent fever, Benin fever " and so on.

23. Even as recently as 1910 when an outbreak occurred at Sekondi, the true nature of the disease was at first denied by local medical men and in the Press.

24. In reporting on this particular outbreak when ten out of one hundred and twenty whites were attacked and all but one died, Rice drew attention to the fact that " Sometimes the medical officers have discussed the possibility of certain cases being yellow fever and in other instances have called it so, but in the annual return this disease has usually been conspicuous by its absence, and, apparently, whether by accident or design, it had never been given official recognition."

25. The chief reason for the reluctance in official circles to disclose the true state of affairs at that period rested in the serious consequences to trade which

followed the placing of ports in quarantine. Ships preferred to pass by such a port than to enter it and lay themselves open to expensive demurrage at subsequent ports of call.

26. Since the International Sanitary Conventions—the latest being that of 1926—notification of recognised cases of yellow fever has been promptly effected.

27. Following the Dakar Yellow Fever Conference of 1928, Health Authorities of West African Administrations have kept each other well informed of the occurrence and progress of such epidemics.

28. Reference to the Dakar Conference recalls the fact that some of our foreign colleagues appeared to be inclined, at that time, to doubt the incidence of yellow fever in the indigenous inhabitants.

29. For many years white residents were regarded as non-immunes and the locals Africans as immunes.

30. That the West African is almost as liable to the disease as a European, was demonstrated in no uncertain a manner in 1926 in the Gold Coast.

31. It is estimated that, in that year, in one comparatively small town situated about sixty miles inland from the port of Accra, 1,500 of the 6,000 inhabitants sickened with yellow fever and 150 died.

32. The admirable work of the members of the Rockefeller Foundation who have devoted their lives to yellow fever research and, in particular, the work of those who, in co-operation with the local medical authorities in West Africa, have carried out a large number of mouse-protection tests, has tended to show that the distribution of the virus is even more widespread than had hitherto been supposed.

33. It is only fair in this connection, to mention that some observers have cast a certain amount of doubt on the specificity of the mouse-protection test.

34. For example, Boyé (1934) writing of the test in French Equatorial Africa and in the Cameroons, drew attention to the fact that Libreville had been in occupation by the whites for over 80 years. During this period no cases of yellow fever had ever been diagnosed, although the protection test indicated an index of 20 per cent.

35. Findlay points out that the Gambia Protectorate has been visited by Europeans for 480 years and that there is no record of any outbreak among Africans, although in five villages examined there were from 18 to 33 per cent positive sera.

36. Beeuwkes (1934), under whose direction an extremely valuable amount of research has been carried out in Africa in recent years, refers to a series of 1,643 mouse-protection tests in Equatorial Africa, 18.4 per cent of which were positive, although no cases of yellow fever had ever been diagnosed in the area concerned.

37. The discovery of natives giving positive mouse-protection tests in Western Uganda, the Anglo-Egyptian Sudan and in places hitherto regarded as remote from yellow fever areas calls for special consideration.

38. If, as is maintained by Sawyer, Findlay and others, the test is specific for the yellow fever virus, can the results be interpreted to mean that the disease is gradually working its way across Africa to the territories in the east and south ? Does it mean that before long the continent of Asia with its teeming millions in India, China, Malaya, etc., may be exposed to devastating outbreaks similar to those from which the West Coast of Africa, Central and South and America and the West Indies have suffered ?

39. Perhaps it would be as well first of all to try to envisage the problem as it exists in the old endemic areas of West Africa.

40. The opening up of the country has necessitated the construction of railways and roads which enable persons to travel many hundred miles in the course of a few days where before a trek on foot or in a hammock for 15–25 miles a day was considered a good average distance to traverse.

41. In addition, airways are being rapidly developed, although it is readily granted that they, as yet, provide a means of rapid transit which is capable of very careful supervision, if necessary, as in the case of shipping.

42. It is very doubtful, however, whether effective control of land frontiers is ever practicable in the case of pedestrians and rapidly travelling motor lorries. The last mentioned may prove a far greater danger than aircraft as regards the dissemination of yellow fever.

43. So much for the movement of peoples. Now as regards the possible reservoirs of the virus.

44. If full confidence can be placed in the mouse-protection test, there is good reason to believe that cases of yellow fever are to be found in many of the larger centres of population as well as in rural areas throughout West Africa and that these may become manifest when the association of infected person, mosquito vector and susceptible (European or Syrian) is sufficiently close.

45. For many years children have been regarded as a source of the virus, since there are ample grounds for belief that they may suffer from a mild form of the disease which goes unrecognised. Mild, unrecognised attacks do, of course, occur in African adults also, the possible explanation being the existence of some degree of racial resistence comparable with that found in the African monkey.

46. This calls to mind the fact that the protection test in children under 12 years in a large town in the Northern Territories Protectorate gave an index of 40 per cent, in spite of the fact that no case had been recorded in the town in question for at least twelve years and perhaps longer.

47. For vectors of the disease, it is well known to all that the classical experiments in 1901 of Reed, Carroll, Agramonte, Lazear and of the French Commission have stood the test of time and that *Aedes aegypti* in Africa is still the most important carrier under natural conditions.

48. It is well to remember, however, that this mosquito does not always bite by night and that it may bite outside dwellings. On the other hand, it is reasonable to continue to regard this species as very largely a domestic breeder and biter with a decided preference for biting after 3 p.m. and before 9 a.m.

49. Unfortunately from the epidemiological standpoint, recent work of the Rockefeller Foundation, of the British, French, Brazilians and others, has established the fact that other varieties of *Aedes* are capable of transmitting the disease—e.g., *Aedes scapularis* in the Espirito Santo outbreak of 1934 (first proved to be a potential carrier by Davis and Shannon in 1929). In addition *C. fatigans* (Davis 1933) one of the commonest house-haunting culicidae in West Africa, *C. thalassius* (Kerr 1932) a very common brackish water breeder along the West Coast and a vicious biter, *Mansonia africana* (Philip 1930), and *Eretmopodites chrysogaster* (Bauer 1928) may also transmit the virus.

50. The term " unfortunately " is used since it is apparent that the scope of anti-mosquito work is inevitably widened when there is more than the *Aedes aegypti* involved.

51. From actual experience in the Gold Coast, it has been found that efforts taken to reduce to a minimum the breeding of the *Aedes* group are usually successful in towns in preventing an outbreak from starting and in bringing an epidemic, once started, to an end.

52. By the word " minimum " is meant the finding of less than one sample of *Aedes* larvae in one hundred houses examined. If the index rises to two or over per hundred, an epidemic may eventuate if infection is introduced and there is a sufficient body of so-called non-immunes in the locality (that is to say, people who have never suffered from yellow fever nor received the virus inoculation).

53. Before the Health branch of the Medical Department was established in the Gold Coast after the epidemic of 1910, the larval index was nearly one hundred per centum for all towns examined.

54. In 1934, during which year nearly two million house-to-house inspections were carried out (particular attention being paid to mosquito breeding), the index was 0·5 or one instance of breeding in every two hundred houses examined.

55. While steps to prevent the breeding of *Aedes* are of prime importance, it is desirable to emphasise that infestation of houses by other potential vectors must also be prevented.

56. It is possible that the very occasional outbreaks reported from towns in West Africa where the *Aedes* index is known to be low, may have arisen from the introduction of one or more reservoirs of virus at a time when these other vectors were present in large numbers. Epidemiological data on this point, however, are too meagre as yet.

57. Here, it might be wise to mention the possibility of alternative hosts, e.g., the Socay monkey suspected as an animal host of the virus in Colombia, Soper

(1935)—*see* also Findlay's work on the hedgehog and the recent incrimination of the Colobus monkey on the Gold Coast and chimpanzee and baboon in the Belgian and French Congo.

58. The existence of an alternative host would certainly help to explain the occurrence and maintenance of yellow fever in the thinly populated areas in the Matto Grosso of Brazil.

59. It is advisable at this juncture to give a few details of the actual steps taken in the Gold Coast to combat breeding of the mosquito vectors—the area covered being about the size of England and Wales and the population concerned 3½ million.

60. Apart from a considerable amount of preventive work carried out by the Hospitals branch, a whole-time Health branch was established in 1911. This comprises over two hundred African sanitary inspectors, village overseers, etc., some twenty-one European sanitary superintendents, three women medical officers in charge of welfare centres, eight medical officers of health, three senior health (regional) officers and a deputy director who is head of the branch and responsible to the director of the Medical Department as a whole.

61. Every town of importance is covered by the service and a number of the larger villages also possess health personnel in the form of sanitary overseers, mosquito inspectors and headmen.

62. In parts of the Northern Territories, this staff is augmented by partly trained personnel paid by the Native Administration.

63. The standard aimed at is to secure a thorough inspection of all dwellings and their precincts at least once a week. Experience shows that under normal conditions of temperature and food supply the interval between the laying of an egg and the emergence of an adult mosquito varies from nine to fourteen days.

64. It is not proposed to give a list of the hundred and one places in which the *Aedes* group is able to breed since these are familiar to all. Suffice to say that such breeding may take place in as small a quantity as one teaspoonful of water.

65. Inspection work has, of course, to be very carefully supervised by the European personnel, although the inspecting officer is protected to a large extent by the existence of anti-mosquito laws—the most important of which was promulgated in 1911.

66. As has been already indicated, anti-mosquito work has also to be directed towards the eradication of other potential vectors, e.g., *C. thalassius* and *M. africana*, although these are probably far less important factors in the spread of the disease.

67. Before leaving the subject of mosquito control—and more particularly anti-*Aedes* activities—it is strongly urged that consideration should be given by other Administrations in tropical and sub-tropical Africa to the institution of a similar organisation at any rate against the mainly domestic breeding *Aedes* group.

68. It is submitted that a service of such a nature is not only a duty of the territories concerned to themselves (as an obvious prophylactic measure against the onward march of yellow fever), but that it is virtually an absolute obligation in the interests of other regions, e.g. India, which are being brought almost daily nearer to the old endemic centres by transport developments.

69. In the view of some, no administration in tropical and sub-tropical Africa can afford to shelve its responsibility to the world—apart from itself—in this matter.

70. Whilst a perusal of the annual medical reports of the African territories outside West Africa has not afforded exact information regarding the *Aedes* index, there is good ground to suppose that the index is often a high one.

71. Lest Health Authorities in the countries just referred to should feel some hesitation in allocating for anti-*Aedes* work a portion of what is, in all probability all too slender a budget, it should be mentioned that the personnel employed can be used for general health purposes.

72. In Rio de Janeiro and other South American cities, anti-*Aedes* squads have been brought into being in the past few years as the result of serious epidemics of yellow fever and it is now possible in Rio to sleep without a mosquito net.

73. In West Africa, however, it is found practicable to combine anti-*Aedes* activities with those relating to the prevention of plague, tuberculosis, enteric, dysentery, etc., and with general house and compound sanitation.

74. This point is given emphasis so that Health administrators in other parts of Africa may consider whether or not it is possible to graft anti-Aedes duties on to the work already being carried out by their inspectorate.

75. Intimately connected with mosquito control is the question of the provision of pipe-borne water supplies. It follows that the need for wells, tanks, barrels, eaves-guttering and the many other methods of storing water can be eliminated immediately an adequate piped water supply is available.

76. For this reason, *inter alia,* the British West African Governments do their best, within the limits of their finances, to provide all the ports and larger centres of population with such supplies.

77. After mosquito control comes the question of the segregation of so-called non-immunes.

78. It has been pointed out already that ample evidence is available to the effect that the indigenous population of West Africa is almost as liable as the white element to yellow fever infection—in the absence of the immunity acquired by a previous attack.

79. At the same time it is the experience of those most qualified to express an opinion on the matter that the case mortality rate in whites in endemic areas is far higher.

80. In the last serious outbreak in Accra, for example, the case mortality in the non-indigenous group reached nearly 80 per cent.

81. In saying this, it should be made clear that certain number of the milder cases may be missed. It may be remembered that as long ago as 1901 Carroll of the American Commission proved that genuine yellow fever might be so mild in character that no one would feel justified in diagnosing the disease. Some of the cases of laboratory infection in London in more recent years amply support this viewpoint.

82. Usually, however, whites are certainly the worst sufferers and the presence of Europeans or Syrians living in close contact with Africans, especially in areas where mosquito control is absent or ineffective, has time after time served as an indicator of the existence of yellow fever in the African community—possibly unsuspected until them.

83. In reporting on the serious outbreak in the Gold Coast in 1910 already referred to, Rice pointed out the importance of segregating whites from the natives.

84. He instanced the death and invaliding rates respectively for the preceding five years in the affected township as 0·5 and 16 for white officials and 23 and 86 for non-officials. The officials enjoyed the advantage of living in areas separated from the African township, a privilege not shared by the non-officials.

85. Boyce, who was sent out by the Secretary of State to report and advise on the epidemic, wrote : " In conclusion, I would place segregation of whites (non-immunes) in the forefront of all prophylactic measures at the present time in West Africa. It is practicable and can be carried out at once ".

86. The Medical and Sanitary Advisory Committee of the Colonial Office subsequently endorsed this and advised that steps should be taken to ensure that whites were accommodated in special residential areas separated by at least a quarter of a mile from the African townships. The object of the building-free zone was to diminish, as far as possible, the danger of mosquitos infected in the African quarter from flying to the houses of the whites.

87. It is true that mosquitos of this type have been known to fly a greater distance but it is probable that they rarely do so. The same cannot be said of *C. thalassius* or *M. africana* ; but, as has been pointed out, these latter are of secondary importance.

88. The value of segregation of whites and the danger attending the reverse has been proved over and over again in the Gold Coast (and very recently in the Gambia also) and remains the accepted policy of that Government to this day. Its profound usefulness was accepted by all the West African Administrations represented at the Dakar Conference in 1928.

89. It should be emphasised that this measure is in no possible sense a social matter or an instance of the colour bar, but is based upon purely scientific findings—that the yellow fever virus can and does exist in the West African native (especially in children) in a mild and unrecognisable form.

90. The incrimination in the past seven years of vectors other than the *Aedes* group renders the need for segregation still greater, for any given area with an *Aedes* index of zero can no longer be regarded as safe.

91. Apart from the prevention of mosquito breeding (and mosquito destruction) and the segregation of the non-African element in special residential areas, other prophylactic measures taken by the Gold Coast and other West African Administrations include (*a*) education of general public, (*b*) use of mosquito screening, nets and mosquito boots, (*c*) quarantine, (*d*) early notification of cases, (*e*) isolation of cases, (*f*) observation or surveillance of contacts and persons arriving by land, sea and air, from infected areas, (*g*) fumigation of infected quarters and neighbouring dwellings, (*h*) restriction on embarkation and movements of persons living in an infected area, (i) post-mortem examination of all bodies of persons dying in a registration area without having been medically attended within a week of death, (*j*) viscerotomy of persons dying after an illness of ten days or less accompanied by a history of fever of unknown origin, and lastly, (*k*) vaccination against the disease.

92. There is not sufficient time to discuss in detail the various measures enumerated above, but it might interest those representatives of African Administrations to which the disease has not yet spread if brief reference is made to three.

93. Vaccination against the disease may be taken first. Thanks to the pioneer work of Stokes, Bauer and Hudson, it has been possible to evolve and elaborate a vaccine which gives every promise of conferring a considerable degree of immunity.

94. Let it suffice to say that no fatalities have been reported in the personnel of research laboratories since vaccination was introduced, whereas before this such men as Noguchi, Adrian Stokes and Young—to mention but a few—had laid down their lives in the effort to elucidate the problem.

95. Findlay has succeeded in vaccinating nearly 900 persons up to the present time with an attenuated (latterly viscerotropic tissue) virus and immune serum with a comparatively small number of untoward reactions. It is true that some difficulty has been experienced in regard to the immune serum and efforts have been made to secure serum from an alternative source, e.g. horse and goat. The objection to this kind of serum lies in the danger of serum sickness and, possibly, anaphylactic shock, especially in view of the fact that those resident in the Tropics are liable to receive prophylactic tetanus anti-toxin following injuries. This difficulty will, it is hoped, be surmounted by securing an adequate supply of human serum and Soper of the Rockefeller Foundation has, it is understood, kindly undertaken to assist in this way.

96. A stage has been reached when the Medical Advisers to the Colonial Office feel justified in strongly recommending that all whites proceeding to West Africa should undergo vaccination against the disease. Until an adequate quantity of human serum is available it may not be possible to make vaccination compulsory, although it is already, practically speaking, compulsory in the case of whites travelling to the Gambia where a distressing outbreak occurred in 1934.

97. Furthermore, arrangements are in train to make it possible for all pilots and white ground staff operating in areas where yellow fever is endemic to undergo protective vaccination and before long, it should be possible to offer protection to all non-indigenous persons actually resident in West Africa.

98. The medical authorities in the Gold Coast urge Europeans to be vaccinated in the middle of their leave when they feel fit and strong. They advise that vaccination should not be undergone just before such persons return from leave owing to the possibility of a reaction or to the precipitating of an attack of malaria.

99. The period of duration of protection is not yet known, but it might be of interest to note that the speaker has a titre of 1/32 two years after the original vaccination and that Findlay considers this to provide ample protection against infection.

100. This Conference may care to advise the compulsory vaccination of the personnel of aircraft operating between endemic regions and countries as yet free from yellow fever.

101. Viscerotomy really constitutes a diagnostic procedure. It can also be regarded, however, as a preventive measure, since the early discovery of cases allows of steps to be taken to limit the spread of infection.

102. This procedure was originally devised by members of the Rockefeller Foundation—who have contributed so much to our knowledge of the malady—carrying out anti-yellow fever work in South America.

103. The aim is to remove small portions of the livers of those who have died after suffering from a fever of less than ten days duration and where the cause of death is unknown.

104. The sections are withdrawn by means of an instrument called a viscerotome and are fixed, stained and examined microscopically for Councilman's lesions associated with yellow fever.

105. The operation obviates the need for a complete post-mortem examination which may give rise to serious opposition from relatives and friends of the deceased and to concealment of death.

106. In the Gold Coast a viscerotomy service has been inaugurated in the larger centres of population, the apparatus having been generously supplied by Findlay and the Rockefeller Foundation.

107. So far no positive results have been recorded in the Gold Coast, but a comparatively small number of sections have been taken and it is possible that this may be otherwise when, as is hoped, the service has become general throughout all death registration districts, comprising about one-tenth of the total population of the Colony.

108. From the results already obtained in South America, there can be little doubt as to the usefulness of this simple form of check on the yellow fever situation.

109. Quarantine constitutes the last of the anti-yellow fever measures which it is proposed to discuss.

110. The steps which can be taken to control the possibility of sea-borne yellow fever are governed by the International Sanitary Convention of 1926.

111. The terms of the Convention are no doubt familiar to all and for that reason it is not proposed to discuss them here.

112. It is sufficient to state that ancilliary legislation exists in the laws of the British West African Colonies which gives power to confine infection as far as possible within the limits of the actual infected area and to prevent its spread through the medium of infected humans and mosquitos.

113. A brief reference is necessary, however, to the possible dissemination of the yellow fever virus by air to countries as yet unaffected.

114. The progress in civil aviation during the past decade has been truly remarkable. The Gambia already serves as a link between Europe, north-west Africa and the South American continent and lines are in the process of being established linking up such places as Khartoum, Maiduguri, Kano, Lagos, and Accra and along the coast.

115. Moreover, and for many years past, a regular service has existed between Europe and North and French West Africa.

116. It is believed that the time is not far distant before air-lines may be established across the continent of Africa—from west to east, e.g., the one contemplated between French West Africa, Nigeria, Congo, Angola and Madagascar.

117. For this reason it would appear to be important that general principles should be adopted to obviate the danger of transference of yellow fever—apart from other major infectious diseases—from an endemic area to " clean " territories.

118. The International Sanitary Convention for Aerial Navigation of 1933 laid down a useful procedure which all the contracting parties might well follow.

119. The word " might " is used advisedly, since a considerable amount of discretion is left in the hands of the contracting parties as to whether or not to establish sanitary aerodromes. A sanitary aerodrome is, of course, one possessing an organised medical service, a place for medical inspection, equipment for collecting and despatching suspected material, facilities for the isolation, transport and care of the sick and for carrying out any other prophylactic measures in suitable premises, and one possessing apparatus for disinfection, disinfestation and deratisation, a sufficient supply of wholesome drinking water, a satisfactory system for the disposal of excreta, refuse and sullage and one, as far as possible, protected from rats.

120. Article 36 of the Convention is of particular importance, since it places a duty on all contracting parties of territories suspected as being endemic areas for yellow fever to ascertain whether the disease in fact exists—even when not recognisable clinically.

121. Article 38 lays down that in territories where the disease is found to exist in a clinical or *biological* form; aerodromes, used for inter-territorial craft must be sanitary aerodromes, must also be situated at a distance from an inhabited centre, must be provided with a water supply completely protected against mosquitos, and must possess mosquito-proof dwellings for the crews of aircraft and the ground staff and similar dwellings in which passengers can be accommodated or hospitalised if they are suspected to be suffering from yellow fever or have been exposed to infection within the previous six days.

122. Under Article 44, it will be remembered that if a person has been exposed to infection with yellow fever, he may be subjected to observation within the precincts of the aerodrome or elsewhere under conditions approved by the local health authority for a period not exceeding six days from the day on which he could have been infected.

123. Article 47 empowers the health authority of regions where yellow fever does not exist but where conditions might permit of its development to retain under observation for six days from the last possible date of infection, persons who may have been exposed to infection during the previous six days.

124. Under Article 53, a person arriving by air at an aerodrome may not continue his voyage if he is liable to observation, the incubation period for yellow fever not having expired since the date of his possible infection.

125. As in the case of shipping, so with aircraft, the health authority takes into account the measures known to be adopted in local regions. In other words if well-equipped anti-amaryl aerodromes exist, combined with an efficient anti-yellow fever organisation in the surrounding territory, vexatious delays are far less likely to be experienced. In this connection, it is understood that some of the French lines operating in Africa have firmly declined to allow their craft to land in regions where anti-amaryl aerodromes do not exist.

126. In order to safeguard non-infected territories from the possible transference of the virus by aircraft from the Gold Coast, steps have been taken by that Government to establish two anti-amaryl aerodromes, one about three miles from Tamale, the seat of Government of the Northern Territories, and a second a few miles from Accra, the capital of the Colony.

127. Administrations in other parts of Africa may rest assured that everything possible will be done to ensure a high standard of sanitation at and in the neighbourhood of these aerodromes.

128. In parenthesis, it might be well to stress very strongly the value of the existing European residential zones since these provide " clean " areas in which intending passengers may reside prior to embarking on aircraft. (It is assumed that, for some time to come, the bulk of passengers will be whites.)

129. Routine disinfection of aircraft on their arrival and departure will be carried out.

130. The Air Council advises that the inside of aircraft should be disinfected an hour or so before departure with an insecticide solution, e.g. white kerosine 1000 cc., concentrated extract of pyrethrum 5 gm., and oil of sassafras 5 cc.

131. The practice of the Imperial Airways in connection with its aircraft operating in tropical regions is to have aeroplanes disinsecticised half an hour before departure—" Flit " or a similar mixture being used for the purpose and to provide a system of curtains at the time of embarkation and disembarkation.

132. Arising out of the question of mosquitos in aircraft, it is suggested that consideration be given to the desirability for the proofing with some durable type of mosquito gauze, for example, Monel metal, of the fusellage, that part of the aeroplane utilised for the storage of luggage, and passengers and pilots cabins.

133. Such proofing would serve a double purpose. It would reduce to a minimum the chance of mosquitos finding cover amongst the baggage and it world render the aircraft rat-proof—a matter of some little importance in plague areas.

134. It has been suggested that an additional safeguard against the dissemination of yellow fever by aircraft might take the form of requiring not only the personnel but all intending passengers to be protected by inoculation with vaccine.

135. It is probably well known to all that in some parts of the world passengers are required to be protected against plague, cholera and smallpox.

136. The reaction from vaccination with the tissue virus and human immune serum is, in most cases, far less than that experienced from the above-mentioned.

137. Perhaps, in the first instance, it would suffice if a recommendation were made that all crews of aerodromes in endemic areas and all pilots operating in such regions should undergo protective vaccination.

138. It must, it is felt, be borne in mind that restrictions on air services should be as light as is compatible with the safety of regions as yet unaffected with yellow fever. The essence of air travel, is, of course, speed ; undue delay brought about by preventive measures would be incompatible with this desideratum.

139. Furthermore, it would surely be unreasonable to heap restrictions on aircraft when it is well-nigh impossible to control the movements of high-powered motor lorries—large fleets of which make frequent journeys from endemic areas in West Africa to surrounding territory. It is understood that motor tours are actually advertised from Nairobi to, for example, the Northern Congo where the mouse-protection test has shown yellow fever to have been present at sometime.

140. Obviously, lorry loads of natives, some of whom may be suffering from mild and unrecognisable attacks of yellow fever, must, in the nature of things, constitute a far greater potential danger than the comparatively small number of passengers carried by aircraft—most of whom have probably lived under conditions rendering infection less likely than with coloured residents from congested towns.

141. Before leaving this subject, an assurance can be given that every effort will be made in the British West African territories to limit the possibility of the transportation of yellow fever by aircraft and to wage a ceaseless war against the occurrence and spread of infection within those territories.

142. At the same time, it is strongly urged that it is in the interests of other Administrations to take such steps in their own areas to control mosquito breeding both in and around their landing grounds and in the neighbouring townships.

## *Summary.*

1. Yellow fever is endemic in West Africa and is probably indigenous to that region as to Central and South America.

2. Both white and coloured populations are liable to infection, but the existence of a certain amount of racial resistence in the blacks affords some protection and results in a much lower case mortality rate.

3. Mouse-protection tests indicate that the virus is more widespread than was formerly supposed, even the western part of Uganda being involved. Is the disease gradually spreading eastward to endanger India and the East in course of time ?

4. The high index of positive mouse-protection tests in many towns in West Africa combined with the absence of cases of yellow fever over prolonged periods in such towns indicates that the local Africans, especially children, may serve as unrecognisable reservoirs of infection.

5. The development of all forms of transport favours the dissemination of the disease.

6. Alternative hosts, e.g. monkeys, may account for the keeping up of infection in the rural areas.

7. The members of the *Aedes* group remain the most important vectors in West Africa, but *C. fatigans*, *C. thalassius*, *M. africana*, and possibly, *Eretmopodites chrysogaster*, may also have to be taken into account in preventive measures.

8. Anti-*Aedes* activities continue to serve as the sheet anchor in yellow fever prevention. The standard aimed at is an index of less than one sample of mosquito larvae in every hundred houses examined in all ports, towns and larger villages—every house being examined once in 7–9 days.

9. Such anti-mosquito work is dependent upon the existence of a well-organised preventive branch of the Medical Department —in the case of the Gold Coast this was inaugurated in 1911.

10. It is urged that administrations to which yellow fever may be carried—by land, sea or air—should seriously consider their responsibilities to themselves and to other territories capable of being infected through them. Mosquito brigades can be used for general sanitary duties.

11. The installation of pipe-borne water supplies is instanced as an important ancillary of anti-mosquito campaigns.

12. Regional planning, the provision of residential areas in which the more susceptible members of the community (whites) may reside, proves a most valuable method of protection. Boyce regarded this as the most important preventive measure as far as Europeans were concerned.

13. The education of the general public and school children by means of posters, lectures, health days, and, as a last resort, by prosecutions and fines for breeding mosquito larvae on premises, is of service.

14. Vaccination with tissue virus and immune serum of so-called non-immunes constitutes a valuable safeguard. It is especially useful for research workers and medical staff likely to come into contact with cases of the disease or persons compelled to live in close proximity to African dwellings. It is submitted for the consideration by the Conference that vaccination should be compulsory of ground and flying staff attached to aircraft operating between endemic and " clean " regions suitable for the spread of the disease.

15. Viscerotomy is mentioned as a means of early diagnosis and that consideration may be given by the Conference to its application on a wide scale so as to serve as an indicator of where preventive measures should be carried out.

16. Quarantine measures are discussed including those which can be taken under the Sanitary Convention on Aerial Navigation of 1933. The desirability of limiting restrictions on air travel and of rendering local areas safe is stressed.

17. The question of urging the mosquito-proofing—as far as may be practicable—of aircraft operating in areas infected or likely to be infected with yellow fever is submitted for the consideration of the Conference.

18. An assurance is given that every possible step will be taken in British West Africa to render endemic regions less dangerous to neighbouring territories.

Beeuwkes H. and Mahaffy A.F. (1934) " The past incidence and distribution of yellow fever in West Africa as indicated by protection test surveys. " *Trans. Roy. Soc. Trop. Med. and Hyg.*, XXVIII, 39.

Boyé (1934) " Les recherches concernant le test de protection contra la fièvre jaune en Afrique Equatorial Francaise et au Cameroun." *Bull. Off.*, t., XXVI, F. 6., P. 1061.

Soper F.L. (1935) " Rural and jungle yellow fever. A new public health problem in Colombia." (Lecture before the Faculty of Medicine of Bogota).—*Bogota Editorial Minerva, S.A.* (translated from Rev. Hig. 1935, V).

## APPENDIX VI.

### Report of the Pan-African Health Conference held at Johannesburg, 20th to 30th November, 1935.

In November, 1932, a Conference of the health representatives of certain African territories met in Capetown under the auspices of the Health Committee of the League of Nations. That Conference dealt with a number of matters such as yellow fever, plague, smallpox, leprosy, rural hygiene, dengue fever, and the transmission of diseases other than yellow fever by aircraft. On almost every one of these subjects—notably in the case of yellow fever—further information or new developments calling for action by public health authorities seemed likely to need attention in the near future. For this reason and since the advantages afforded of personal discussion between responsible officials of neighbouring territories in Africa had been so strikingly shown at the Conference, the delegates considered it desirable that a similar Conference should be convened after an appropriate interval and that the League of Nations should be invited to take steps not later than 1935 to ascertain the wishes of Administrations concerned in this matter.

The Union Government felt that so much advantage had accrued to it from the Conference that in August, 1934, it again approached the Health Organisation of the League, reminded it of the resolution taken at that Conference and suggested that a further Conference should be held in November of the present year, and pointing out that the Union Government would be happy again to provide the venue of the Conference and to act as host.

The matter was considered by the Council of the League which, on the technical advice of the Health Committee, decided in January, 1935, that the proposal should be agreed to.

Accordingly, invitations were issued in February, 1935, to the Governments of African countries concerned as well as to the Office International d'Hygiène Publique, the Sanitary Maritime and Quarantine Board of Egypt, and the Rockefeller Foundation. The Government of British India was invited to send an observer.

The Health Committee and the Office International d'Hygiène Publique nominated Sir Thomas Stanton as a joint representative at the Conference, and Dr. R. Gautier was appointed General Secretary.

Owing to health reasons, Sir Thomas Stanton was unable to proceed to South Africa and subsequently the Health Committee appointed Dr. R. Gautier in his stead and in the dual capacity of representative and General Secretary. The Office International d'Hygiène Publique appointed Colonel P. G. Stock as its representative at the Conference so that Colonel Stock, who had already been appointed a Union Government delegate, also filled a dual rôle.

The following countries were represented :—

Angola
Basutoland
Bechuanaland
Belgian Congo
French East Africa
Gambia
Gold Coast
Kenya
Mozambique
Nigeria
Northern Rhodesia.
Nyasaland
Sierra Leone
Southern Rhodesia
Swaziland
Tanganyika
Uganda
Union of South Africa
Zanzibar.

In addition, representatives of the following bodies attended the Conference :—

Health Committee of the League of Nations ;
Office International d'Hygiène Publique ;
Rockefeller Foundation ;

while India sent an observer.

The Conference was in session from November 20th to 30th, inclusive, Sir Edward Thornton being appointed Chairman and Dr. P. G. Stock, Vice-Chairman.

The Honourable the Minister of Public Health (Mr. J. H. Hofmeyr) presided at the opening meeting and welcomed the delegates on behalf of the Union Government.

The Agenda of the Conference is given in Annexure I.

The Conference decided that the last item, i.e. the possibility of improving the system of epidemiological intelligence between countries on the line of regular air traffic or countries bordering thereon, which had been introduced at the request of the Egyptian Government and of the Sanitary Maritime and Quarantine Board of Egypt, should be deleted from the Agenda in the absence of a representative from Egypt and owing to the fact that this item required further discussion on the part of the Office International d'Hygiène Publique.

The other items, after having been discussed in the plenary meetings, were referred for detailed study and report to one of the following committees :—

(1) The Committee on Yellow Fever, Plague and Malaria ;

(2) The Committee on :—
  (*a*) Rural Hygiene and Medical Services in Africa ;
  (*b*) Proposals for the better co-ordination of Health Services in Africa ; and

(3) The Committee on :—
  (*a*) Typhus Fever ;
  (*b*) the typhoid carrier problem in African natives ;
  (*c*) diseases conveyed by animals to man ;
  (*d*) dangers associated with locust poisoning.

The first committee deemed it advisable to establish three sub-committees to deal separately with yellow fever, plague and malaria.

The resolutions of the Conference and the reports of these committees together with the relevant documents are submitted.

On all these subjects, valuable information was obtained, and the experience afforded of the advantages of personal discussion between responsible officials of neighbouring territories in Africa was again so strikingly demonstrated that as will be seen from Resolution No. 9 (*c*) the delegates had no hesitation in recommending that conferences be convened in future.

The Conference before concluding unanimously adopted a resolution expressing its appreciation of the able way in which the chairman had presided over its deliberations.

It is the duty and pleasure of the Conference to place on record its cordial thanks to the Government of the Union of South Africa and to the Chamber of Mines for the generous hospitality extended to the delegates.

The Conference when it met in Johannesburg found that, through the courtesy of the Principal, most suitable accommodation had been provided at the University of the Witwatersrand for its meetings and that in this and in other ways much thought had been given by the Union Health Department to details which would facilitate the conduct of its business and meet the convenience of delegates. The Conference desires to express its grateful appreciation of these facilities as well as the consideration which the delegates have received from the Mayor and City Council of Johannesburg, the Chamber of Mines, the University of the Witwatersrand and other hosts.

The Conference also wishes to express its gratitude for the complete arrangements made by the Public Health Department of the Union of South Africa and for the carrying out of the secretarial and clerical duties, which were in the hands of Mr. A Stuart of that Department.

## RESOLUTIONS OF THE CONFERENCE.

### 1. YELLOW FEVER.

The Conference recommends :—

(1) That investigations as to the existence of yellow fever by means of the mouse-protection test, accompanied or followed by clinical investigation and histopathological examination (including the routine use of the viscerotome) be carried out in all endemic regions in Africa and particularly along the periphery of such regions in order to ascertain as soon as possible those in which the disease actually exists.

(2) That an intensive study of the possibility of the existence of jungle yellow fever in Africa should be made in view of the presence of this condition in South America.

(3) That consideration be given to the training of laboratory workers in yellow fever research and routine investigations and that provision be made for permanent laboratory facilities in centres accessible to endemic areas.*

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*(1) (A conclusion of a somewhat similar nature (No. 5) was reached at the Capetown Conference of 1932).

(4) That further investigations be made regarding the distribution of *Aedes aegypti* both in endemic and in other African territories to which the disease may spread.

(5) That consideration be given to the organization of measures for the control of *Aedes aegypti* in all territories included within and bordering upon endemic areas.*

(6) That a system be established of quarterly reports to the office International d'Hygiène Publique of house larval indices relating to *Aedes aegypti* from important centres in endemic areas.

(7) Every first case of yellow fever and the locality in which it has occurred to be notified direct, by telegram, as soon as official information is available, to the Office International d'Hygiène Publique by African Colonial Administrations.

(8) The decision to suspend traffic in an aerodrome which, situated in a region in which yellow fever has appeared, is not organised in accordance with the provisions of Article 38 of the Aerial Sanitary Convention of 1933, and the decision to reopen the aerodrome to traffic to be similarly notified direct to the Office International d'Hygiène Publique.

(9) That the personnel of aircraft operating in endemic areas be protected by vaccination against yellow fever.

(10) That investigations be made as to the practicability of mosquito-proofing of aircraft used in endemic areas or of taking other measures against mosquito infestation of aircraft.

(11) That the principle of residential areas reserved for European accommodation in yellow fever endemic areas (which has proved so valuable a protection to the non-indigenous element in the past) should be strictly adhered to.

2. PLAGUE.

The Conference considers :—

(1) That the best practical policy for towns is to concentrate on the systematic building out of rats, and to supplement it by effective rodent destruction plus the creation of deep rodent-free belts around boundaries, rather than to rely on such measures as mass prophylatic inoculation.

(2) That in countries where spread is mainly by wild rodents, the setting up and maintenance of barriers by gassing, poisoning and trapping plus an attack on domestic rodents is strongly to be recommended in every case.

(3) That in countries where the domestic rodent problem is an important factor and where it defies control, prophylactic vaccination may have to be undertaken in addition to such anti-rodent measures as are practicable.

(4) That an organisation independent of territorial limitations should be established to :—

- (*a*) conduct investigations in such manner and at such centres as may be determined, into all matters relating to plague, and particularly into the question of the mode of its propagation and means of control in Africa, production of vaccine and sera, and cognate matters ;
- (*b*) co-ordinate observations made by individual workers in the several countries ;
- (*c*) disseminate information.

(5) That information regarding the existence, progress and measures for the control of human and rodent plague in a country should in addition to communications already required by International Conventions, be immediately and directly communicated to its neighbours and should embody the fullest detail in regard to the position near a mutual border where measures should be correlated ;

(6) What provision should be made for training the rodent officers of contiguous countries on similar lines and if possible together.

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*(2) (The two preceding resolutions, follow, generally, the thirteenth and fourteenth conclusions, respectively, arrived at in the discussion on yellow fever at the Capetown Conference in 1932).

3. MALARIA.

The Conference recommends :—

(1) That advance with regard to malaria is in the first place required along the following lines :—

- (*a*) the improvement of the economic status of the African ;
- (*b*) the study of malaria as a disease ;
- (*c*) the extension of research into the bionomics of the dangerous anophelines of Africa.

(2) That in view of the widespread nature of malaria infection and the part that tolerance to this condition must play in the lives of the indigenous populations under existing conditions more intensive research be carried out in Africa on the following particular problems :—

- (*a*) child mortality from malaria in indigenous communities.
- (*b*) the extent to which the working capacity of the indigenous adult population is interfered with by malaria.
- (*c*) the influence of malaria on racial increase.
- (*d*) the influence of occasional drug treatment on immunity and particularly the question whether there is any danger to a primitive community in such treatment.
- (*e*) the influence of malaria infection in conjunction with other infections on the mental development of African children.
- (*f*) the various strains of the malaria parasite in Africa and the action of various therapeutic substances on the various strains and especially on the gametes of these strains.

(3) That the apparent successful results in control of malaria obtained in certain areas by the destruction of adult anophelines with insecticidal sprays warrants a continuance of research.

(4) That consideration be given to the possibility of holding from time to time advanced courses in Africa for the study of malaria and its prevention under African conditions.

(5) That while research along the lines suggested in the foregoing resolutions is an urgent matter, it must not be forgotten that without raising the economic status of the vast bulk of the population of Africa as a whole there can be no hope of applying successfully on a continental scale the results of research or of markedly improving the position of great populations with regard to malaria as a disease.

4. TYPHUS.

The Conference considers that the raising of the economic status of the native population is the only practical way of eradicating endemic typhus.

5. THE TYPHOID CARRIER PROBLEM IN AFRICA.

The Conference recommends :

(*a*) that further research be undertaken on the use of vaccines for the sterilisation of carriers.

(*b*) that improvements in the conditions of milk production and distribution combined with efficient pasteurization of milk on a wide scale must be insisted upon in Africa.

6. THE DANGERS OF LOCUST CAMPAIGNS.

The Conference recommends that further research be undertaken with a view to finding a method for the destruction of locusts which will be less dangerous to human and animal life than the use of sodium arsenite.

7. ANIMAL DISEASES COMMUNICABLE TO MAN.

(1) *Rabies.*—The Conference recommends that further research be undertaken in connection with the transmission and eradication of rabies and that the biology of the small carnivores should be studied with a view to the elaboration of some method of destroying them.

(2) *Bovine Tuberculosis.*—The Conference recommends that investigations should be continued to determine definitely whether bovine tuberculosis is a menace to the population under the conditions obtaining in African territories.

(3) *Trypanosomiasis.*—The Conference notes with satisfaction the progress made in the campaign against tsetse flies, particularly the invention of various effective traps.

It expresses the hope that continued and adequate support will be given by Governments to further work on *trypanosomiasis* in order that complete success may be achieved in ridding Africa of this great scourge.

(4) *Helminths.*—The Conference recommends the abolition of all insurance schemes intended to compensate farmers for slaughter animals found to be infected with measles.

It urges that an endeavour be made to improve hygienic conditions on farms and the taking of all steps necessary to prevent the infection of animals with *Cysticercus.*

(5) *Brucellosis.*—The Conference considers that in view of the widespread occurrence of *Brucella* infection in cattle and other animals in Africa further research on the relation between these diseases and undulant fever in man as well as the relation between the different species of *Brucella* is highly desirable.

## 8. HYGIENE AND MEDICAL SERVICES IN RURAL AREAS.

The Conference:—

(1) Satisfied that the medical and sanitary services of Africans will have to be largely provided by African personnel, notes with gratification the advances made in the training of Africans for subordinate medical, nursing and sanitary services and urges that these be continued and extended.

(2) Satisfied that the education of women is a most important factor in racial progress and noting that in many countries it is difficult to obtain a sufficient number of African girls with the preliminary education which would enable their being trained as nurses and midwives, trusts that the Governments concerned will endeavour to further by every possible means the education of African girls.

(3) Notes with satisfaction the improvement in collaboration between the various departments of Governments in the great task of maintaining the health of African populations and being convinced that the solution of the very difficult problems which face the medical services of African countries is practically impossible without the whole-hearted co-operation of the peoples and the Governments of these countries, trusts that such co-operation will be further improved and extended.

(4) Considers that aeroplanes for transporting patients and medical and sanitary personnel could be more widely utilised in many countries of Africa with advantage to efficiency and economy and that co-operation with existing commercial air services and aeroplane clubs would within a reasonable time and at relatively low cost be forged into a very important weapon not only for preventing suffering and mortality but for maintaining the health of the populations and combating epidemics.

(5) Recognising that the economic status of the population is the most important factor both in the spread and prevention of endemic and epidemic diseases as well as in generally conserving the health of communities ;

Recognising also the basic importance of an adequate and continuous food supply and the inadequacy of existing knowledge as to available food supplies the possibility of augmenting these, the possibility of introducing other varieties of food than are at present in use ; the lack of knowledge of the metabolism of natives, their mental capacity, especially in regard to latent mental capacity ; recognising in fact that there exist problems too numerous to detail here ;

Considers that urgent need for establishing at some suitably situated place in Africa an institution adequately staffed, equipped and financed, to undertake the investigation of these fundamental problems.

## 9. PROPOSALS FOR THE BETTER CO-ORDINATION OF HEALTH SERVICES IN AFRICA.

The Conference :—

(*a*) Is of opinion that the Health Committee of the League of Nations should set up a Committee to deal with African health problems, and that the personnel of this Committee should include medical officers with African medical administrative experience.

(*b*) Considers that the Health Committee of the League of Nations and the several Governments concerned should take into consideration the possibility of arranging an exchange from time to time of individual medical personnel between the various countries in Africa.

(*c*) Is strongly of the opinion that in the light of experience of the two Pan-African Conferences that the best results would be achieved by arranging hereafter for two types of Conferences: Pan–African Health Conferences to be held, say, every fourth year, and Group Health Conferences, primarily for the discussion of problems of special interest to certain groups of African countries at similarly spaced intervals, between the Health Conferences.

For example, Pan-African Conferences in 1939, 1943, 1947, etc; Group Conferences in 1937, 1941, 1945, etc.

(*d*) Suggests that in convening Group Conferences the principal consideration in inviting the participants should be similarity of the main problems to be discussed.

P. S. SELWYN–CLARKE,
*Acting Director of Medical Services.*

[illegible]
6 OCT 1936
& TROPICAL DISEASES